Three stages of evolutions of spacetime/intrinsic spacetime and parameters/intrinsic parameters and the associated hierarchies of spacetimes/intrinsic spacetimes and parameters/intrinsic parameters in a universe. Part I.

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Three stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe are isolated. The *ab initio* absolutely immaterial state of a universe with flat 'four-dimensional' absolute-absolute spacetime containing absolute-absolute rest mass and its underlying flat 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime containing absolute-absolute intrinsic-intrinsic rest mass, evolved into an intermediate absolute material state with flat 'four-dimensional' absolute spacetime containing absolute rest mass and its underlying flat 'two-dimensional' absolute intrinsic spacetime containing absolute intrinsic rest mass, at the first stage; followed by evolution into yet an intermediate relative material state with flat four-dimensional proper spacetime containing rest mass and its underlying flat two-dimensional proper intrinsic spacetime containing intrinsic rest mass, at the second stage. These are then followed by evolution into a final relative material state with flat four-dimensional relativistic spacetime containing relativistic (or inertial) mass and its underlying flat two-dimensional relativistic intrinsic spacetime containing relativistic intrinsic mass (or intrinsic inertial mass), at the third (and final) stage. The three stages commenced and progress simultaneously and are still on-going in every universe at present. The second and third stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe, correspond to the first and second stages in a gravitational field, already developed in the previous papers. The associated hierarchies of spacetimes and masses (comprising of three layers of space-time-mass) in every universe is highlighted.

1 Hierarchy of spacetimes/intrinsic spacetimes in a universe

This paper is a continuation of the previous series of papers [1-9] on new spacetime/intrinsic spacetime geometries in a four-world picture. Some new concepts are added in this paper in order to accommodate the new hierarchy of theories of dynamics, new hierarchy of theories of gravity and the union of these, in every universe, to be developed upon the new spacetime/intrinsic spacetime geometries in the subsequent papers.[1]

The flat 'three-dimensional' absolute space $\hat{\Sigma}$ of the positive (or our) universe and the flat 'three-dimensional' absolute space $\hat{\Sigma}^0$ of the positive time-universe are orthogonal Euclidean 3-spaces. This, as defined in sub-section 1.1 of [3], implies that each coordinate $\hat{x}^{0j}$; $j = 1, 2, 3$ of $\hat{\Sigma}^0$ is perpendicular to every coordinate $\hat{x}^i$; $i = 1, 2, 3$ of $\hat{\Sigma}$. That is, $\hat{x}^{0j} \perp \hat{x}^i$ for $i, j = 1, 2, 3$. Graphically, let us consider $\hat{\Sigma}^0$ as a three-dimensional hyper-surface to be represented by a vertical plane surface and $\hat{\Sigma}$ as three-dimensional hyper-surface to be represented by a horizontal plane surface, yielding Fig. 1.
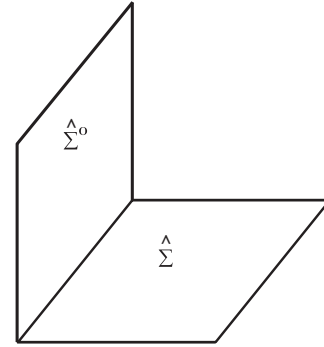
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Fig. 1: The orthogonal flat '3-dimensional' absolute spaces of our universe and the positive time-universe.

This is the same as Fig. 1 of [3], except that proper physical Euclidean 3-spaces $\Sigma^{0\prime}$ and Σ' (denoted by $E^{0\prime 3}$ and E'^3 in that figure) have been replaced by the absolute spaces $\hat{\Sigma}^0$ and $\hat{\Sigma}$ respectively in Fig. 1 here.

As explained for orthogonal proper Euclidean 3-spaces in sub-section 1.2 of [3], the 'three-dimensional' absolute space $\hat{\Sigma}^0$ along the vertical geometrically contracts to a 'one-dimensional' absolute space to be denoted by $\hat{\rho}^0$ with respect to '3-observers' in the absolute space $\hat{\Sigma}$ along the horizontal

and $\hat{\Sigma}$ along the horizontal geometrically contracts to a 'one-dimensional' absolute space to be denoted by $\hat{\rho}$ with respect to '3-observers' in $\hat{\Sigma}^0$. Thus Fig. 1 becomes Fig. 2(a) and Fig. 2(b) with respect to '3-observers' in $\hat{\Sigma}$ and '3-observers' in $\hat{\Sigma}^0$ respectively.
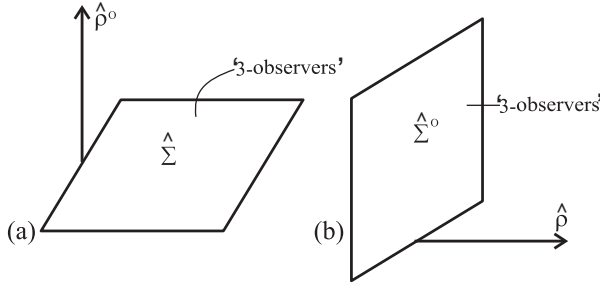

Fig. 2: The orthogonal flat '3-dimensional' absolute spaces of our universe and the positive time-universe in Fig. 1 contract to flat '4-dimensional' absolute space (a) with respect to '3-observers' in '3-dimensional' absolute space of our universe and (b) with respect to '3-observers' in '3-dimensional' absolute space of the positive time-universe.

As done in the process of isolation of two-dimensional proper intrinsic spacetime (or proper nospace-notime) $(\phi\rho', \phi c\phi t')$ of our universe as a non-observable 'shadow' projected into the proper flat four-dimensional physical spacetime of our universe by the flat four-dimensional proper physical spacetime $(\Sigma^{0\prime}, ct^{0\prime})$ of the positive time-universe, in sub-section 1.2 of [4], let us obtain the projection of $\hat{\rho}^0$ lying along the vertical into the 'three-dimensional' absolute space $\hat{\Sigma}$ (considered as a hyper-surface) along the horizontal in Fig. 2(a). If we denote the component of $\hat{\rho}^0$ projected along the horizontal by $\hat{\rho}_h^0$, then we have

$$\hat{\rho}_h^0 = \hat{\rho}^0 \cos \hat{\psi}_0 = \hat{\rho}^0 \cos \frac{\hat{\pi}}{2} = 0 \qquad (1)$$

Now it is the factor $\cos \hat{\pi}/2$ that vanishes in (1) and not $\hat{\rho}^0$ multiplying it. Thus let us re-write Eq. (1) as follows

$$\hat{\rho}_h^0 = \hat{\rho}^0 \cos \frac{\hat{\pi}}{2} = 0 \times \hat{\rho}^0 \equiv \phi\hat{\rho} \qquad (2)$$

Eq. (1) states that $\hat{\rho}^0$ along the vertical projects absolute nothingness into $\hat{\Sigma}$ along the horizontal in Fig. 2(a), while Eq. (2) states that it projects a 'shadow' denoted by $\phi\hat{\rho}$ into $\hat{\Sigma}$. The superscripts "0" label has been dropped on the projective $\phi\hat{\rho}$, since it lies in (or underneath) $\hat{\Sigma}$ without the superscript "0" label.

Any interval of the 'shadow' denoted by $\phi\hat{\rho}$ is equivalent to zero interval of the 'one-dimensional' absolute space $\hat{\rho}^0$ that projects it, as follows from $\phi\hat{\rho} \equiv 0 \times \hat{\rho}^0$ in Eq. (2). Consequently any interval of $\phi\hat{\rho}$ is equivalent to zero interval (or zero distance) of the 'three-dimensional' absolute space $\hat{\Sigma}$ in which (or underneath which) it lies. It is therefore to be referred to as absolute intrinsic space, where 'intrinsic' means

non-observable and non-detectable (or hidden) with respect to '3-observers' in $\hat{\Sigma}$. Also since any interval of $\phi\hat{\rho}$ is zero (or no) interval of the absolute space $\hat{\Sigma}$, $\phi\hat{\rho}$ shall be alternatively referred to as absolute no space to be adulterated as absolute nospace. Recall that proper intrinsic space and proper nospace have been similarly coined for $\phi\rho'$ at the point of isolation of $\phi\rho'$ in sub-section 1.2 of [4].

As explained in sub-section 1.2 of [4], the proper intrinsic space (or proper nospace) $\phi\rho'$ underlying the proper physical Euclidean 3-space Σ' is a one-dimensional isotropic intrinsic space (or isotropic intrinsic dimension) with no unique orientation in the proper physical Euclidean 3-space Σ' with respect to 3-observers in Σ'. The same explanation leads to conclusion that the absolute intrinsic space $\phi\hat{\rho}$ is a 'one-dimensional' absolute intrinsic space with no unique orientation in the flat absolute space $\hat{\Sigma}$ with respect to '3-observers' in $\hat{\Sigma}$.

Let us add the 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}$ projected underneath $\hat{\Sigma}$ by $\hat{\rho}^0$ along the vertical to Fig.2(a) to have Fig. 3(a) with respect to '3-observers' in $\hat{\Sigma}$. Fig. 2(b) will likewise become Fig. 3(b) with respect to '3-observers' in $\hat{\Sigma}^0$.
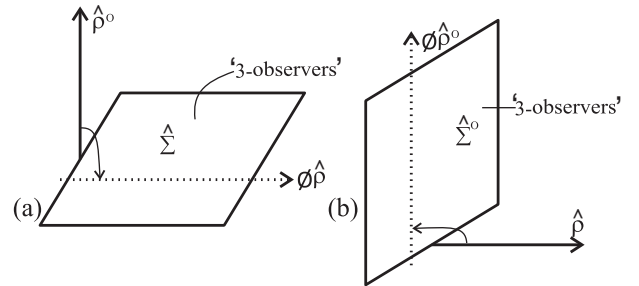

Fig. 3: (a) The 'one-dimensional' absolute space orthogonal to the flat '3-dimensional' space of our universe projects 'one-dimensional' absolute intrinsic space into the absolute space of our universe; (b) the 'one-dimensional' absolute space orthogonal to the flat '3-dimensional' space of the positive time-universe projects 'one-dimensional' absolute intrinsic space into the absolute space of the positive time-universe.

Recall that the 'three-dimensional' flat absolute space $\hat{\Sigma}^0$ of the positive time-universe along the vertical, with respect to '3-observers' in it in Fig. 3(b), is what appears as 'one-dimensional' straight line absolute space $\hat{\rho}^0$ with respect to '3-observers' in the absolute space $\hat{\Sigma}$ of our universe in Fig. 3(a). Thus $\phi\hat{\rho}^0$ along the vertical in Fig. 3(b) is a new entity along the vertical, which must be placed along the vertical in Fig. 3(a) as well to have Fig. 4(a) with respect to '3-observers' in $\hat{\Sigma}$. The absolute intrinsic space $\phi\hat{\rho}$ along the horizontal in Fig. 3(a) is likewise a new entity along the horizontal, which must be placed along the horizontal in Fig. 3(b) as well to have Fig. 4(b) with respect to '3-observers' in $\hat{\Sigma}^0$. The representation of the 'three-dimensional' flat absolute

spaces $\hat{\Sigma}$ and $\hat{\Sigma}^0$ (considered as hyper-surfaces) by plane surfaces in Figs. 1(a) and 1(b) through Figs. 3(a) and 3(b) has been changed to lines in Figs. 4(a) and 4(b) for convenience.

The 'three-dimensional' absolute space $\hat{\Sigma}$ possesses zero absolute co-moving speed ($\hat{V}_0 = 0$) at every point of it with respect to '3-observers' in it, as indicated at one point in $\hat{\Sigma}$ in Fig. 4(a) and the underlying absolute intrinsic space $\phi\hat{\rho}$ possesses zero absolute intrinsic co-moving speed ($\phi\hat{V}_0 = 0$) at every point along its length with respect to '3-observers' in $\hat{\Sigma}$, as also indicated at one point along $\phi\hat{\rho}$ in Fig. 4(a).

On the other hand, the 'one-dimensional' absolute space $\hat{\rho}^0$ along the vertical possesses absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ at every point along its length with respect to '3-observers' in $\hat{\Sigma}$ along the horizontal, as indicated at one point along $\hat{\rho}^0$ in Fig. 4(a) and the intrinsic space $\phi\hat{\rho}^0$ along the vertical possesses absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along its length with respect to '3-observers' in $\hat{\Sigma}$, as indicated at one point along $\phi\hat{\rho}^0$ in Fig. 4(a), where $\hat{c}_0 = |\phi\hat{c}_0| = 3\times10^8$ m/s.

The concept of isotropic co-moving speeds $V_0 = 0$, $V_0 = 0$, $V_0 = c$ and $V_0 = -c$ at every point of the mutually orthogonal proper Euclidean 3-spaces Σ', $-\Sigma'^*$, $\Sigma^{0'}$ and $-\Sigma^{0'*}$ respectively, relative to our Euclidean 3-space Σ', of the four universe and intrinsic co-moving speeds $\phi V_0 = 0$, $\phi V_0 = 0$, $\phi V_0 = \phi c$ and $\phi V_0 = -\phi c$ of their underlying intrinsic spaces $\phi\rho'$, $-\phi\rho'^*$, $\phi\rho^{0'}$ and $-\phi\rho^{0'*}$ respectively, relative to our intrinsic space $\phi\rho'$ and our Euclidean 3-space Σ', were first introduced in subsection 1.1 of [3]. It was deduced there that perfect symmetry of state among the four universes requires that these co-moving speeds (referred to simply as absolute speed in that sub-section) of the Euclidean 3-spaces are not made manifest in motion of the spaces and the intrinsic co-moving speeds (referred to simply as absolute intrinsic speeds) are not made manifest in intrinsic motions of the intrinsic spaces. Consequently the Euclidean 3-spaces of the four universes are stationary relative to one another always despite their different co-moving speeds, likewise the intrinsic spaces of the universes.

It can be said that all points along the 'one-dimensional' absolute space $\hat{\rho}^0$ along the vertical are 'co-moving' at absolute speed $\hat{V}_0 = \hat{c}_0$ (like a one-dimensional fluid flowing at one uniform speed along its length). Consequently every point along $\hat{\rho}^0$ is inclined to the horizontal at equal absolute angle $\hat{\psi}_0 = \hat{\pi}/2$. This is so because $\sin\hat{\psi}_0 = \hat{V}_0/\hat{c}_0$ and letting $\hat{V}_0 = \hat{c}_0$ gives $\sin\hat{\psi}_0 = 1$, hence $\hat{\psi}_0 = \hat{\pi}/2$. Likewise every point along the absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical can be said to be in absolute intrinsic 'co-motion' at absolute intrinsic speed $\phi\hat{V}_0 = \phi\hat{c}_0$ with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 4(a).

Although every point along the 'one-dimensional' absolute space $\hat{\rho}^0$ possesses absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ relative to the absolute space $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 4(a), the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ is not
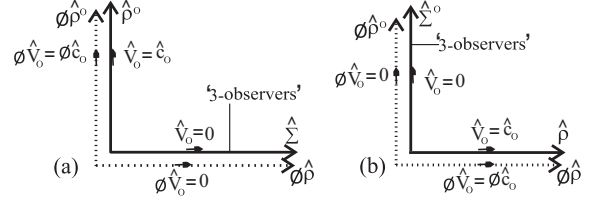

Fig. 4: The resultant flat '4-dimensional' absolute space and underlying flat '2-dimensional' absolute intrinsic space (a) in our universe; (b) in the positive time-universe.

made manifest in absolute motion (or absolute translation), unlike a non-zero absolute dynamical speed $\hat{V}_d$ possessed by the absolute rest mass $\hat{m}_0$ of a particle or object in absolute space $\hat{\Sigma}$, which is made manifest in absolute translation of $\hat{m}_0$ in $\hat{\Sigma}$. It therefore follows that any magnitude of absolute co-moving speed $\hat{V}_0$ is equivalent to zero magnitude of absolute dynamical speed $\hat{V}_d$ (of the theory of absolute motion). All points along $\hat{\rho}^0$ remain absolutely at rest relative to the absolute space $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$), despite their absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ relative to $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 4(a).

Likewise although every point along the 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}^0$ possesses absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ relative to the absolute space $\hat{\Sigma}$ (or with respect to '3-observers' in $\hat{\Sigma}$) in Fig. 4(a), the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ is not made manifest in absolute intrinsic motion (or absolute intrinsic translation), unlike a non-zero absolute intrinsic dynamical speed $\phi\hat{V}_d$ possessed by the absolute intrinsic rest mass $\phi\hat{m}_0$ of a particle or object in absolute intrinsic space $\phi\hat{\rho}$, which is made manifest in absolute intrinsic translation of $\phi\hat{m}_0$ in $\phi\hat{\rho}$. It therefore follows that any magnitude of absolute intrinsic co-moving speed $\phi\hat{V}_0$ is equivalent to zero magnitude of absolute intrinsic dynamical speed $\phi\hat{V}_d$ (of the theory of absolute intrinsic motion). All points along $\phi\hat{\rho}^0$ remain absolutely at rest relative to the absolute intrinsic space $\phi\hat{\rho}$ along the horizontal and relative to the absolute space $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$), despite their absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ relative to $\phi\hat{\rho}$ and $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 4(a).

The absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ of every point along $\hat{\rho}^0$ relative to $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) is not made manifest in absolute gravitational field (or in absolute gravity) in $\hat{\rho}^0$, unlike a non-zero absolute gravitational speed $\hat{V}_g(\hat{r})$ in $\hat{\rho}^0$, which is made manifest in absolute gravitational field (or in absolute gravity) in $\hat{\rho}^0$. It thus follows that any magnitude of absolute co-moving speed $\hat{V}_0$ is equivalent to zero magnitude of absolute gravitational speed $\hat{V}_g(\hat{r})$. Any magnitude of absolute intrinsic co-moving speed $\phi\hat{V}_0$ is likewise equivalent to zero magnitude of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$. Thus every point along $\hat{\rho}^0$ possesses zero absolute gravitational field and every point along $\phi\hat{\rho}^0$ possesses zero absolute intrinsic gravitational field with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 4(a).

The discussion based on Fig. 4(a) with respect to '3-observers' in the absolute space $\hat{\Sigma}$ in that figure in the foregoing three paragraphs, equally applies to Fig. 4(b) with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in that figure.

The uniform absolute co-moving speeds $\hat{V}_0$ of all points in the absolute spaces $\hat{\Sigma}$, $\hat{\rho}^0$, $\hat{\Sigma}^0$ and $\hat{\rho}$ and the uniform absolute intrinsic co-moving speeds $\phi\hat{V}_0$ of all points along the absolute intrinsic spaces $\phi\hat{\rho}^0$ and $\phi\hat{\rho}$ relative to the indicated '3-observers' in Figs. 4(a) and 4(b), exist *ab initio*, prior to the establishment of non-uniform absolute gravitational speeds $\hat{V}_g(\hat{r})$ in the absolute spaces $\hat{\Sigma}\,\hat{\rho}^0$, $\hat{\Sigma}^0$ and $\hat{\rho}$ by sources $\hat{M}_0$ of absolute gravitational field in $\hat{\Sigma}$ and $\hat{\rho}$ and sources $\hat{M}_0^0$ of absolute gravitational field in $\hat{\Sigma}^0$ and $\hat{\rho}^0$ in the context of the theory of absolute gravity (AG) and prior to the establishment of absolute intrinsic gravitational fields in the absolute intrinsic spaces $\phi\hat{\rho}^0$ and $\phi\hat{\rho}$ by sources $\phi\hat{M}_0$ and $\phi\hat{M}_0^0$ of absolute intrinsic gravitational fields in $\phi\hat{\rho}$ and $\phi\hat{\rho}^0$ respectively in the context of the theory of absolute intrinsic gravity (ϕAG). Observe that Figs. 4(a) and 4(b) obtain in the absence of absolute gravitational field sources in $\hat{\Sigma}$ and $\hat{\Sigma}^0$ and consequently in the absence of absolute intrinsic gravitational field sources in $\phi\hat{\rho}$ and $\phi\hat{\rho}^0$. It is then certain that $\hat{V}_0$ and $\phi\hat{V}_0$ are not absolute gravitational speed and absolute intrinsic gravitational speed.

The uniform absolute co-moving speed $\hat{V}_0$ of every point in the absolute spaces $\hat{\Sigma}$, $\hat{\rho}^0$, $\hat{\Sigma}^0$ and $\hat{\rho}$ also exist *ab initio*, prior to possession of absolute dynamical speed $\hat{V}_d$ by the absolute rest masses $\hat{m}_0$ of material particles and objects in $\hat{\Sigma}$ and $\hat{\rho}$ and by the absolute rest masses $\hat{m}_0^0$ of material particles and objects in $\hat{\Sigma}^0$ and $\hat{\rho}^0$ in the context of the theory of absolute motion (AM). The uniform absolute intrinsic co-moving speed of points along the absolute intrinsic spaces $\phi\hat{\rho}$ and $\phi\hat{\rho}^0$ likewise exist *ab initio*, prior to possession of absolute intrinsic dynamical speeds $\phi\hat{V}_d$ by absolute intrinsic rest masses $\phi\hat{m}_0$ and $\phi\hat{m}_0^0$ of material particles and bodies in $\phi\hat{\rho}$ and $\phi\hat{\rho}^0$ respectively in the context of the theory of absolute intrinsic motion (ϕAM). It is again certain that $\hat{V}_0$ and $\phi\hat{V}_0$ are not absolute dynamical speed and absolute intrinsic dynamical speed.

The absolute co-moving speed $\hat{V}_0$ can be described as 'created' with the absolute spaces $\hat{\Sigma}$, $\hat{\rho}^0$, $\hat{\Sigma}^0$ and $\hat{\rho}$ and the absolute intrinsic co-moving speeds $\phi\hat{V}_0$ as 'created' with the absolute intrinsic spaces $\phi\hat{\rho}^0$ and $\phi\hat{\rho}$ in Figs. 4(a) and 4(b). Further properties and significance of the absolute co-moving speeds and absolute intrinsic co-moving speeds shall emerge with further development in this paper.

The isolation of the 'two-dimensional' absolute intrinsic space (or 'two-dimensional' absolute nospace) $(\phi\hat{\rho}, \phi\hat{\rho}^0)$ in Fig. 4(a) and $(\phi\hat{\rho}^0, \phi\hat{\rho})$ in Fig. 4(b) above is the first stage of the coordinate projection procedure used to isolate them. There is a second stage of the procedure that shall now be presented.

Now at the second stage, the absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical in Fig. 4(a) projects a component to be denoted by $\phi\hat{\rho}_h^0$ into $\hat{\Sigma}$ along the horizontal, which is given like Eq. (1) as follows

$$\phi\hat{\rho}_h^0 = \phi\hat{\rho}^0 \cos\phi\hat{\psi}_0 = \phi\hat{\rho}^0 \cos\frac{\phi\hat{\pi}}{2} = 0 \qquad (3)$$

However it is the factor $\cos\phi\hat{\pi}/2$ that vanishes in Eq. (3) and not $\phi\hat{\rho}^0$ multiplying it. Thus let us re-write Eq. (3) as follows

$$\phi\hat{\rho}_h^0 = \phi\hat{\rho}^0 \cos\frac{\phi\hat{\pi}}{2} = 0 \times \phi\hat{\rho}^0 \equiv \phi\phi\hat{\hat{\rho}} \qquad (4)$$

While Eq. (3) states that the absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical projects absolute nothing into $\hat{\Sigma}$ along the horizontal in Fig. 4(a), Eq. (4) states that it projects a 'shadow' denoted by $\phi\phi\hat{\hat{\rho}}$ into $\hat{\Sigma}$. The superscript "^{0}" label has been dropped on $\phi\phi\hat{\hat{\rho}}$ since $\phi\phi\hat{\hat{\rho}}$ lies in (or underneath) $\hat{\Sigma}$ without the superscripts "^{0}" label. A second hat label has been introduced on $\phi\phi\hat{\hat{\rho}}$ because it must be absolute with respect to $\phi\hat{\rho}$ and $\hat{\Sigma}$, as shall be adequately explained elsewhere with further development.

The new entity $\phi\phi\hat{\hat{\rho}}$ in Eq. (4), which is projected into $\hat{\Sigma}$ along the horizontal by the absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical, at the second stage of the coordinate projection procedure being used to isolate the hierarchy of absolute intrinsic spaces at present, lies underneath the absolute intrinsic space $\phi\hat{\rho}$ projected into $\hat{\Sigma}$ at the first stage of the coordinate projection procedure. Any interval of $\phi\phi\hat{\hat{\rho}}$ is equivalent to zero interval of the absolute intrinsic space $\phi\hat{\rho}^0$ that projects it, as follows from $\phi\phi\hat{\hat{\rho}} \equiv 0 \times \phi\hat{\rho}^0$ in Eq. (4). Consequently any interval of $\phi\phi\hat{\hat{\rho}}$ is equivalent to zero interval of the absolute intrinsic space $\phi\hat{\rho}$ along the horizontal in Fig. 4(a), which should overlie $\phi\phi\hat{\hat{\rho}}$ when $\phi\phi\hat{\hat{\rho}}$ is incorporated into Fig. 4(a), as shall be done shortly.

In other words, any interval of $\phi\phi\hat{\hat{\rho}}$ is zero (or no) interval of the absolute intrinsic space $\phi\hat{\rho}$. This means that $\phi\phi\hat{\hat{\rho}}$ is intrinsic, that is, non-observable and non-detectable (or hidden) with respect to hypothetical 'one-dimensional' absolute-intrinsic-rest-mass-observers in $\phi\hat{\rho}$. Consequently $\phi\phi\hat{\hat{\rho}}$ is intrinsic-intrinsic with respect to '3-observers' in the absolute space $\hat{\Sigma}$. The 'shadow' $\phi\phi\hat{\hat{\rho}}$ projected into $\hat{\Sigma}$ along the horizontal by $\phi\hat{\rho}^0$ along the vertical in Fig. 4(a) is therefore to be referred to as absolute-absolute intrinsic-intrinsic space with respect to '3-observers' in $\hat{\Sigma}$.

Also since any interval of $\phi\phi\hat{\hat{\rho}}$ is zero (or no) interval of the absolute nospace $\phi\hat{\rho}$, then $\phi\phi\hat{\hat{\rho}}$ shall be referred to as absolute-absolute no nospace, which shall be adulterated to absolute-absolute nonospace, as an alternative name to absolute-absolute intrinsic-intrinsic space, with respect to '3-observers' in $\hat{\Sigma}$.

The 'one-dimensional' absolute-absolute intrinsic-intrinsic space (or 'one-dimensional' absolute-absolute nonospace) $\phi\phi\hat{\hat{\rho}}$ lies underneath the 'one-dimensional' absolute intrinsic space (or absolute nospace) $\phi\hat{\rho}$. It is consequently an isotropic absolute-absolute intrinsic-intrinsic 'dimension'

with no unique orientation in the absolute space $\hat{\Sigma}$ with respect to '3-observers' in $\hat{\Sigma}$, like $\phi\hat{\rho}$ is an isotropic absolute intrinsic 'dimension' in $\hat{\Sigma}$ with respect to '3-observers' in $\hat{\Sigma}$.

Let us add the absolute-absolute intrinsic-intrinsic space (or absolute-absolute nonospace) $\phi\phi\hat{\hat{\rho}}$ projected into $\hat{\Sigma}$ by $\phi\hat{\rho}^0$ along the vertical to Fig. 4(a) to have Fig. 5(a), which is valid with respect to '3-observers' in the absolute space $\hat{\Sigma}$ in the positive (or our) universe. Fig. 4(b) will likewise become Fig. 5(b) with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in the positive time-universe.

The absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ in Fig. 5(b) is a new entity along the vertical, which must be placed along the vertical in Fig. 5(a) as well to have Fig. 6(a) with respect to '3-observers' in the absolute space $\hat{\Sigma}$ in our universe. The absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ in Fig. 5(a) is likewise a new entity along the horizontal, which must be placed along the horizontal in Fig. 5(b) as well to have Fig. 6(b) with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in the positive time-universe.

Every point along the absolute-absolute intrinsic-intrinsic space (or absolute-absolute nonospace) $\phi\phi\hat{\hat{\rho}}$ along the horizontal in Fig. 6(a) possesses zero absolute-absolute intrinsic-intrinsic co-moving speed ($\phi\phi\hat{\hat{V}}_0 = 0$) with respect to '3-observers' in $\hat{\Sigma}$, as indicated at one point along $\phi\phi\hat{\hat{\rho}}$ in Fig. 6(a). On the other hand, every point along the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ along the vertical in Fig. 6(a) possesses absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ with respect to '3-observers' in $\hat{\Sigma}$.

Although every point along the 'one-dimensional' absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ possesses absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ relative to the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ along the horizontal and consequently relative to the absolute space $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 6(a), (as shown at one point along $\phi\phi\hat{\hat{\rho}}^0$), the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ is not made manifest in absolute-absolute intrinsic-intrinsic motion (or absolute-absolute intrinsic-intrinsic translation) of $\phi\phi\hat{\hat{\rho}}^0$, unlike a non-zero absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ possessed by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0^0$ of a particle or object in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$, which is made manifest in absolute-absolute intrinsic-intrinsic translation of $\phi\phi\hat{\hat{m}}_0^0$ in $\phi\phi\hat{\hat{\rho}}^0$.

It then follows that any magnitude of absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0$ is equivalent to zero magnitude of absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ (of the theory of absolute-absolute intrinsic-intrinsic motion ($\phi\phi$AAM)). Consequently all points along $\phi\phi\hat{\hat{\rho}}^0$ remain absolutely at rest relative to the absolute-absol-

ute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ along the horizontal and consequently relative to the absolute space $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$), despite their absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ relative to $\phi\phi\hat{\hat{\rho}}$ and $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 6(a).

The absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ of every point along the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ is not made manifest in absolute-absolute intrinsic-intrinsic gravitational field (or absolute-absolute intrinsic-intrinsic gravity), unlike a non-zero absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ established in $\phi\phi\hat{\hat{\rho}}^0$ by the source $\phi\phi\hat{\hat{M}}_0^0$ of absolute-absolute intrinsic-intrinsic gravitational field in $\phi\phi\hat{\hat{\rho}}^0$, which is made manifest in absolute-absolute intrinsic-intrinsic gravitational field in $\phi\phi\hat{\hat{\rho}}^0$. It therefore follows that any magnitude of absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0$ is equivalent to zero magnitude of absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ (of the theory of absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG)). Consequently all points along $\phi\phi\hat{\hat{\rho}}^0$ possess zero absolute-absolute intrinsic-intrinsic gravitational potential or field, despite their absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ relative to $\phi\phi\hat{\hat{\rho}}$ and and consequently relative to $\hat{\Sigma}$ (or relative to '3-observers' in $\hat{\Sigma}$) in Fig. 6(a).

The discussion based on Fig. 6(a) with respect to '3-observers' in the absolute space $\hat{\Sigma}$ in that figure in the foregoing two paragraphs, equally applies to Fig. 6(b) with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in that figure.

The uniform absolute-absolute intrinsic-intrinsic co-moving speeds $\phi\phi\hat{\hat{V}}_0$ of points along the absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}^0$ and $\phi\phi\hat{\hat{\rho}}$ relative to the indicated '3-observers' in Figs. 6(a) and 6(b), exist *ab initio*, prior to the establishment of non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ in the absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}^0$ and $\phi\phi\hat{\hat{\rho}}$ by sources $\phi\phi\hat{\hat{M}}_0^0$ and $\phi\phi\hat{\hat{M}}_0$ of absolute-absolute intrinsic-intrinsic gravitational fields in $\phi\phi\hat{\hat{\rho}}^0$ and $\phi\phi\hat{\hat{\rho}}$ respectively, in the context of the theory of absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG). This is certainly so since Figs. 6(a) and 6(b) obtain in the absence of $\phi\phi\hat{\hat{M}}_0^0$ and $\phi\phi\hat{\hat{M}}_0$.

The uniform absolute-absolute intrinsic-intrinsic co-moving speeds $\phi\phi\hat{\hat{V}}_0$ of points along the absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}^0$ and $\phi\phi\hat{\hat{\rho}}$ relative to the indicated '3-observers' in Figs. 6(a) and 6(b), likewise exist *ab initio*, prior to possession of absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ by the absolute-absolute intrinsic-intrinsic rest masses $\phi\hat{\hat{m}}_0$ of material particles and objects in these absolute-absolute intrinsic-intrinsic spaces in the context of the theory of absolute-absolute intrinsic-intrinsic motion ($\phi\phi$AAM). The absolute-absolute intrinsic-intrinsic co-mov-
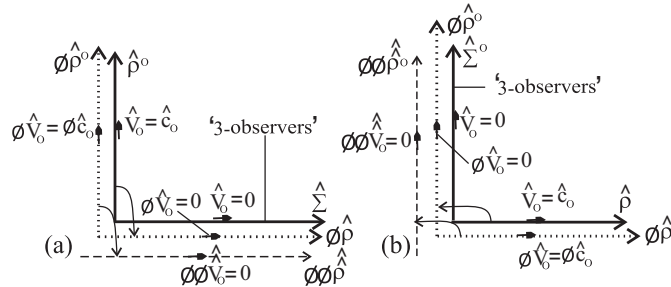
Fig. 5: (a) The 'one-dimensional' absolute intrinsic space orthogonal to the flat '3-dimensional' absolute space of our universe in Fig. 4, projects 'one-dimensional' absolute-absolute intrinsic-intrinsic space into the '3-dimensional' absolute space, underneath the 'one-dimensional' absolute intrinsic space in our universe; (b) the 'one-dimensional' absolute intrinsic space orthogonal to the flat '3-dimensional' absolute space of the positive time-universe in Fig. 4, projects 'one-dimensional' absolute-absolute intrinsic-intrinsic space into the '3-dimensional' absolute space, underneath the 'one-dimensional' absolute intrinsic space in the positive time-universe.
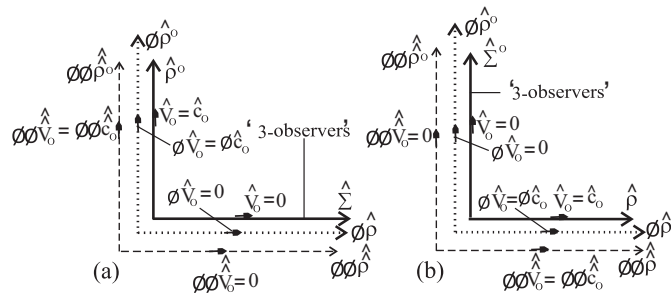
Fig. 6: The resultant diagram in which flat '4-dimensional' absolute space is underlied by flat '2-dimensional' absolute intrinsic space and flat '2-dimensional' absolute-absolute intrinsic-intrinsic space (a) in our universe; (b) in the positive time-universe.

Fig. 7: The flat '4-dimensional' absolute space underlied by flat '2-dimensional' absolute intrinsic space and flat '2-dimensiona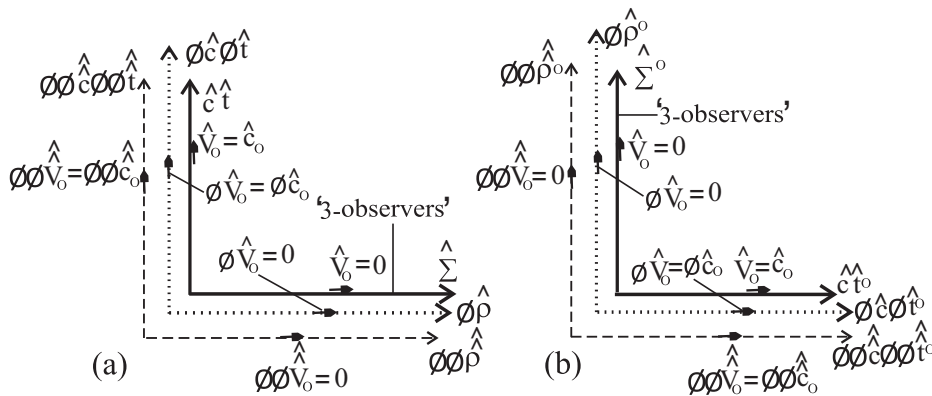l' absolute-absolute intrinsic-intrinsic space in Fig. 6, become flat '4-dimensional' absolute spacetime underlied by flat '2-dimensional' absolute intrinsic spacetime and flat '2-dimensional' absolute-absolute intrinsic-intrinsic spacetime, with respect to 'observers' in absolute space (a) in our universe; (b) in the positive time-universe.

ing speeds $\phi\phi\hat{\hat{V}}_0$ can be described as 'created' with the absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}^0$ and $\phi\phi\hat{\hat{\rho}}$ in Figs. 6(a) and 6(b).

As the final step, the 'one-dimensional' absolute space $\hat{\rho}^0$, the 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}^0$ and the 'one-dimensional' absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ along the vertical must be replaced by absolute time 'dimension' $\hat{c}\hat{t}$, absolute intrinsic time 'dimension' (or absolute notime) 'dimension' $\phi\hat{c}\phi\hat{t}$ and absolute-absolute intrinsic-intrinsic time 'dimension' (or absolute-absolute nonotime 'dimension') $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ respectively with respect to '3-observers' in the absolute space $\hat{\Sigma}$ in our universe in Fig. 6(a) to have Fig. 7(a).

The 'one-dimensional' absolute space $\hat{\rho}$, the 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}$ and the one-dimensional' absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ along the horizontal must be replaced by absolute time 'dimension' $\hat{c}\hat{t}^0$, absolute intrinsic time 'dimension' (or absolute notime) 'dimension' $\phi\hat{c}\phi\hat{t}^0$ and absolute-absolute intrinsic-intrinsic time 'dimension' (or absolute-absolute nonotime 'dimension') $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^0$ respectively with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in the positive time-universe in Fig. 6(b) to have Fig. 7(b).

The absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ at every point along the length of the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}^0$ along the vertical in Fig. 6(a) remains at every point along the absolute-absolute intrinsic-intrinsic time 'dimension' $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ along the vertical in Fig. 7(a). Likewise the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the $\phi\hat{\rho}^0$ in Fig. 6(a) remains at every point along the absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ in Fig. 7(a). And the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ at every point along the 'one-dimensional' absolute space $\hat{\rho}^0$ in Fig. 6(a) remains at every point along the absolute time 'dimension' $\hat{c}\hat{t}$ in Fig. 7(a).

As discussed for $\phi\phi\hat{\hat{\rho}}^0$, $\phi\hat{\rho}^0$ and $\hat{\rho}^0$ along the vertical in Fig. 6(a) earlier, the absolute-absolute intrinsic-intrinsic time 'dimension' $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ along the vertical remains absolutely stationary with respect to the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ along the horizontal in Fig. 7(a) always, despite the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ of every point along the length of $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$; the absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ along the vertical remains absolutely stationary with respect to the absolute intrinsic space $\phi\hat{\rho}$ along the horizontal, despite the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ of every point along $\phi\hat{c}\phi\hat{t}$ and the absolute time 'dimension' $\hat{c}\hat{t}$ remains absolutely stationary with respect to the absolute space $\hat{\Sigma}$, despite the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ of every point along $\hat{c}\hat{t}$ in Fig. 7(a).

As also discussed for $\phi\phi\hat{\hat{\rho}}^0$, $\phi\hat{\rho}^0$ and $\hat{\rho}^0$ along the vertical in Fig. 6(a) earlier, the absolute-absolute intrinsic-intrinsic

co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ of every point along the absolute-absolute intrinsic-intrinsic time 'dimension' $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ is not made manifest in absolute-absolute intrinsic-intrinsic gravitational field (or absolute-absolute intrinsic-intrinsic gravity), unlike a non-zero absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ established in $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ by the source $\phi\phi\hat{\hat{M}}_0^0$ of absolute-absolute intrinsic-intrinsic gravitational field in $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$, which is made manifest in absolute-absolute intrinsic-intrinsic gravitational field in $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$. The absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ of every point along the absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ is not made manifest in absolute intrinsic gravitational field (or absolute intrinsic gravity), unlike a non-zero absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ established in $\phi\hat{c}\phi\hat{t}$ by the source $\phi\hat{M}_0^0$ of absolute intrinsic gravitational field in $\phi\hat{c}\phi\hat{t}$, which is made manifest in absolute intrinsic gravitational field in $\phi\hat{c}\phi\hat{t}$. The absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ of every point along the absolute time 'dimension' $\hat{c}\hat{t}$ is not made manifest in absolute gravitational field (or absolute gravity), unlike a non-zero absolute gravitational speed $\hat{V}_g(\hat{r})$ established in $\hat{c}\hat{t}$ by the source $\hat{M}_0^0$ of absolute gravitational field in $\hat{c}\hat{t}$, which is made manifest in absolute gravitational field in $\hat{c}\hat{t}$.

The discussion in the foregoing three paragraphs between Figs. 6(a) and 7(a) in our universe equally applies between Figs. 6(b) and 7(b) in the positive time-universe.

Fig. 7(a) illustrates the hierarchy of absolute spacetimes in the positive (or our) universe namely, the flat 'four-dimensional' absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$, which is underlied by flat 'two-dimensional' absolute intrinsic spacetime (or absolute nospace-notime) $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$, which, in turn, is underlied by flat 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{t}})$, while Fig. 7(b) illustrates the identical hierarchy of absolute spacetimes in the positive time-universe. There are identical hierarchies of absolute spacetimes (with negative 'dimensions') of the negative universe and negative time-universe.

But for the newly isolated 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ incorporated into it, Fig. 7(a) is the reference geometry to absolute intrinsic Riemannian spacetime geometry, containing flat 'four-dimensional' absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$ underlied by flat 'two-dimensional' absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$, illustrated in Fig. 6 of [6]. The reference geometry of Fig. 6 of [6] to absolute intrinsic Riemannian spacetime geometry, like Fig. 7(a) above, exists in the absence of absolute gravitational field in absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$ and consequently in the absence of absolute intrinsic gravitational field in absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$. Consequently there

is no curved 'two-dimensional' absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ in Fig. 7(a).

The absolute co-moving speeds $\hat{V}_0$ of the absolute spaces $\hat{\Sigma}$ and $\hat{\Sigma}^0$ and absolute time 'dimensions' $\hat{c}\hat{t}$ and $\hat{c}\hat{t}^0$; the absolute intrinsic co-moving speeds $\phi\hat{V}_0$ of the absolute intrinsic spaces $\phi\hat{\rho}$ and $\phi\hat{\rho}^0$ and absolute intrinsic time 'dimensions' $\phi\hat{c}\phi\hat{t}$ and $\phi\hat{c}\phi\hat{t}^0$ and the absolute-absolute intrinsic-intrinsic co-moving speeds $\phi\phi\hat{\hat{V}}_0$ of the absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}$ and $\phi\phi\hat{\hat{\rho}}^0$ and absolute-absolute intrinsic-intrinsic time 'dimensions' $\phi\phi\hat{c}\phi\phi\hat{\hat{t}}$ and $\phi\phi\hat{c}\phi\phi\hat{\hat{t}}^0$, with respect to the indicated '3-observers' in Figs. 7(a) and 7(b), exist in the absence of absolute gravitational field sources in $(\hat{\Sigma}, \hat{c}\hat{t})$ and $(\hat{\Sigma}^0, \hat{c}\hat{t}^0)$ and consequently in the absence of absolute intrinsic gravitational field sources in $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ and $(\phi\hat{\rho}^0, \phi\hat{c}\phi\hat{t}^0)$ and absence of absolute-absolute intrinsic-intrinsic gravitational field sources in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{c}\phi\phi\hat{\hat{t}})$ and $(\phi\phi\hat{\hat{\rho}}^0, \phi\phi\hat{c}\phi\phi\hat{\hat{t}}^0)$. Consequently there are no non-uniform absolute gravitational speeds $\hat{V}_g(\hat{r})$ in $(\hat{\Sigma}, \hat{c}\hat{t})$ and $(\hat{\Sigma}^0, \hat{c}\hat{t}^0)$; no non-uniform absolute intrinsic gravitational speeds $\phi\hat{V}_g(\phi\hat{r})$ in $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ and $(\phi\hat{\rho}^0, \phi\hat{c}\phi\hat{t}^0)$ and no non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{c}\phi\phi\hat{\hat{t}})$ and $(\phi\phi\hat{\hat{\rho}}^0, \phi\phi\hat{c}\phi\phi\hat{\hat{t}}^0)$ in Figs. 7(a) and 7(b).

There are no symmetry-partner particles or objects in absolute motion in Figs. 7(a) and 7(b) either. Consequently there is no absolute dynamical speed $\hat{V}_d$ in in $(\hat{\Sigma}, \hat{c}\hat{t})$ and $(\hat{\Sigma}^0, \hat{c}\hat{t}^0)$; no absolute intrinsic dynamical speed $\phi\hat{V}_d$ in $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ and $(\phi\hat{\rho}^0, \phi\hat{c}\phi\hat{t}^0)$ and no absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{c}\phi\phi\hat{\hat{t}})$ and $(\phi\phi\hat{\hat{\rho}}^0, \phi\phi\hat{c}\phi\phi\hat{\hat{t}}^0)$ in Figs. 7(a) and 7(b). This is why $\hat{V}_0$, $\phi\hat{V}_0$ and $\phi\phi\hat{\hat{V}}_0$ must be seen as created with $\hat{\Sigma}$, $\hat{c}\hat{t}$, $\phi\hat{\rho}$, $\phi\hat{c}\phi\hat{t}$, $\phi\phi\hat{\hat{\rho}}$ and $\phi\phi\hat{c}\phi\phi\hat{\hat{t}}$, as mentioned earlier.

One crucial consequence of the foregoing two paragraphs is that the absolute speed $\hat{c}$ in the absolute time 'dimension' $\hat{c}\hat{t}$ is the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ at every point along $\hat{c}\hat{t}$; the absolute intrinsic speed $\phi\hat{c}$ in the absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ is the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ of every point along $\phi\hat{c}\phi\hat{t}$ and $\phi\phi\hat{c}$ in $\phi\phi\hat{c}\phi\phi\hat{\hat{t}}$ is the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{c}_0$ of every point along $\phi\phi\hat{c}\phi\phi\hat{\hat{t}}$ in Fig. 7(a). This very crucial issue and its implications shall be discussed more fully later in this paper.

As follows from the derivations of the hidden 'dimensions' in this section, the notations used for them namely, attaching symbol ϕ to absolute spacetime to generate absolute intrinsic spacetime (or absolute nospace-notime) and attaching symbol $\phi\phi$ to absolute spacetime to generate absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonspace-nonotime) are not arbitrary or artificial notations, but derived and the natural notations. The appropriateness of attaching the symbol ϕ to space coordinates to generate

intrinsic space coordinates has been discussed under Fig. 5 of [5], following the notations $\phi\hat{M}^3$ for curved 'three-dimensional' absolute intrinsic space (an absolute intrinsic Riemannian metric space) and $\phi E'^3$ for the flat three-dimensional proper intrinsic metric space introduced in Fig. 5 of [5].

The reason why the intrinsic coordinate projection procedure used to derive the absolute intrinsic spacetime (or absolute nospace-notime) $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ at the first stage of the procedure and absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonspace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{c}\phi\phi\hat{\hat{t}})$ at the second stage of the procedure, is not extended to the third and higher stages of the procedure shall be discussed towards the end of this section.

2 Hierarchy of masses/intrinsic masses of a particle or object in a universe

Now let us introduce the absolute rest masses $\hat{m}_0$ and $\hat{m}_0^0$ of symmetry-partner particles in the absolute spaces $\hat{\Sigma}$ and $\hat{\Sigma}^0$ respectively in Fig. 1. Then just as the 'three-dimensional' absolute space $\hat{\Sigma}^0$ of the positive time-universe geometrically contracts to 'one-dimensional' absolute space $\hat{\rho}$ with respect to '3-observers' in the flat absolute space $\hat{\Sigma}$ of our universe, giving rise to Fig. 2(a), the 'three-dimensional' absolute rest mass m_0^0 introduced into $\hat{\Sigma}^0$ is geometrically contracted to a 'one-dimensional' (or a line of) absolute rest mass located in the 'one-dimensional' absolute space $\hat{\rho}^0$ along the vertical relative to '3-observers' in $\hat{\Sigma}$, as illustrated in Fig. 8(a). The 'three-dimensional' absolute rest mass $\hat{m}_0$ introduced into the absolute space $\hat{\Sigma}$ in our universe is likewise geometrically contracted to a line of absolute rest mass located in the 'one-dimensional' absolute space $\hat{\rho}$ along the horizontal with respect to '3-observers' in the absolute space $\hat{\Sigma}^0$ in the positive time-universe, as illustrated in Fig. 8(b).
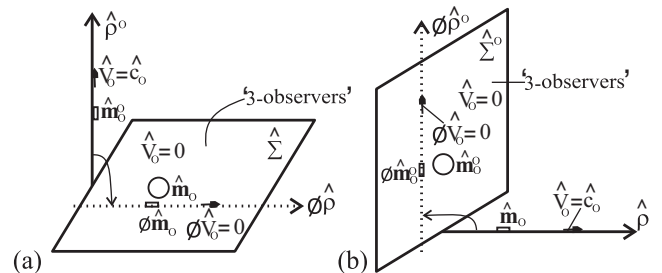
Fig. 8:

Just as the 'one-dimensional' absolute space $\hat{\rho}^0$ along the vertical projects a 'shadow' of absolute intrinsic space $\phi\hat{\rho}$ into the absolute space $\hat{\Sigma}$ along the horizontal with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 3(a), the line of absolute rest mass $\hat{m}_0^0$ located in $\hat{\rho}^0$ in Fig. 8(a) 'projects' a 'shadow' into the absolute space $\hat{\Sigma}$ along the horizontal, which will be located in the projective absolute intrinsic space $\phi\hat{\rho}$ underlying $\hat{\Sigma}$ along the horizontal.

The intrinsic mass relation in the contexts of the theory of absolute intrinsic motion (ϕAM) and theory of absolute intrinsic gravity (ϕAG), involving absolute intrinsic dynamical speed $\phi\hat{V}_d$ and absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ respectively, to be derived formally elsewhere with further development is the following

$$\phi m_0 = \phi\hat{m}_0 \cos^2\phi\hat{\psi} = \phi\hat{m}_0(1 - \frac{\phi\hat{V}^2}{\phi\hat{c}^2}) \qquad (5)$$

where $\phi\hat{\psi}$ is the absolute intrinsic angle of inclination of the absolute intrinsic metric space interval $d\phi\hat{\rho}$ containing $\phi\hat{m}_0$ to the proper intrinsic metric space $\phi\rho'$ along the horizontal and $\phi\hat{V}$ is the absolute intrinsic speed (either $\phi\hat{V}_d$ or $\phi\hat{V}_g(\phi\hat{r})$) of $\phi\hat{m}_0$ along the curved (or inclined) $\phi\hat{\rho}$.

By removing the symbol ϕ from Eq. (5) we obtain its outward manifestation as follows

$$m_0 = \hat{m}_0 \cos^2\hat{\psi} = \hat{m}_0(1 - \frac{\hat{V}^2}{\hat{c}^2}) \qquad (6)$$

The absolute speeds $\hat{V}$ and $\hat{c}$ can be replaced by the absolute co-moving speed $\hat{V}_0$ and $\hat{c}_0$ respectively in Eq. (6). Hence Eq. (6) can be applied for the 'projection' into $\hat{\Sigma}$ along the horizontal of the 'one-dimensional' absolute rest mass $\hat{m}_0^0$ in $\hat{\rho}^0$ along the vertical in Fig. 8(a). If we denote the 'projection' of $\hat{m}_0^0$ into $\hat{\Sigma}$ along the horizontal by $\hat{m}_{0h}^0$, then we must let $\hat{\psi} = \hat{\psi}_0 = \hat{\pi}/2$ and $\hat{V} = \hat{V}_0 = \hat{c}_0$ in Eq. (6), since $\hat{m}_0^0$ acquires absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ along $\hat{\rho}^0$ with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 8(a), to have

$$\hat{m}_{0h}^0 = \hat{m}_0^0 \cos^2\frac{\hat{\pi}}{2} = \hat{m}_0^0(1 - \frac{\hat{c}_0^2}{\hat{c}_0^2}) = 0 \qquad (7)$$

Eq. (7) states that the line of absolute rest mass $\hat{m}_0^0$ in $\hat{\rho}^0$ along the vertical 'projects' absolute nothingness (or casts no 'shadow') into the absolute space $\hat{\Sigma}$ of our universe along the horizontal. However $\hat{m}_0^0$ in $\hat{\rho}^0$ certainly casts a 'shadow' into $\hat{\Sigma}$ in Fig. 8(a). It is the factor $\cos^2\hat{\pi}/2$ or $(1 - \hat{c}_0^2/\hat{c}_0^2)$ that vanishes and not $\hat{m}_0^0$ that multiplies it in Eq. (7). Thus let us re-write Eq. (7) as follows

$$\hat{m}_{0h}^0 = \hat{m}_0^0 \cos^2\frac{\hat{\pi}}{2} = 0\times\hat{m}_0^0 \equiv \phi\hat{m}_0 \qquad (8)$$

While Eq. (7) states that $\hat{m}_0^0$ in $\hat{\rho}^0$ along the vertical 'projects' absolute nothingness into $\hat{\Sigma}$ along the horizontal in Fig. 8(a), Eq. (8) states that it projects 'one-dimensional' 'shadow' denoted by $\phi\hat{m}_0$ into $\hat{\Sigma}$, which is located in the projective $\phi\hat{\rho}$ underlying $\hat{\Sigma}$ along the horizontal in Fig. 8(a). The superscripts "0" has been dropped on $\phi\hat{m}_0$, since it is located in $\phi\hat{\rho}$ without superscripts "0" label.

Any magnitude of the 'one-dimensional' 'shadow' $\phi\hat{m}_0$ is equivalent to zero magnitude of the 'one-dimensional' absolute rest mass $\hat{m}_0^0$ in $\hat{\rho}^0$ that 'projects' it, as follows from $\phi\hat{m}_0 = 0\times\hat{m}_0^0$ in Eq. (8). Consequently any magnitude of

the 'one-dimensional' $\phi\hat{m}_0$ is equivalent to zero magnitude of the 'three-dimensional' absolute rest mass $\hat{m}_0$ in $\hat{\Sigma}$. Hence $\phi\hat{m}$ is intrinsic, that is, non-observable and non-detectable (or hidden) to '3-observers' in $\hat{\Sigma}$. It is therefore to be referred to as absolute intrinsic rest mass. Also since any magnitude of $\phi\hat{m}_0$ is zero (or no) magnitude of absolute rest mass $\hat{m}_0$, $\phi\hat{m}_0$ shall be alternatively referred to as absolute no mass, to be adulterated as absolute nomass. Recall that intrinsic rest mass or proper nomass has been similarly coined for ϕm_0 at the point of isolation of ϕm_0 in sub-section 1.3 of [4].

Considering Fig. 8(b), then the projection of the 'one-dimensional' absolute rest mass $\hat{m}_0$ in the 'one-dimensional' absolute space $\hat{\rho}$ along the horizontal into the absolute space $\hat{\Sigma}^0$ along the vertical, to be denoted by $\hat{m}_{0V}$, with respect to '3-observers' in $\hat{\Sigma}^0$ is

$$\hat{m}_{0V}^0 = \hat{m}_0 \cos^2\frac{\hat{\pi}}{2} = 0\times\hat{m}_0 \equiv \phi\hat{m}_0^0 \qquad (9)$$

The 'one-dimensional' absolute rest mass $\hat{m}_0$ in $\hat{\rho}$ along the horizontal 'projects' 'one-dimensional' absolute intrinsic rest mass (or absolute nomass) $\phi\hat{m}_0^0$ into the absolute space $\hat{\Sigma}^0$, which is located in the projective absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical in Fig. 8(b), according to Eq. (9). The superscript "0" label has been added to the 'projective' $\phi\hat{m}_0^0$ because it is located in the absolute intrinsic space $\phi\hat{\rho}^0$ with superscript "0" label.

The 'projective' 'one-dimensional' absolute intrinsic rest mass (or absolute nomass) $\phi\hat{m}_0$ in Eq. (8) lies in the projective 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}$ along the horizontal, directly underneath the absolute rest mass $\hat{m}_0$ in $\hat{\Sigma}$, as already shown in Fig. 8(a). The 'projective' 'one-dimensional' absolute intrinsic rest mass $\phi\hat{m}_0^0$ likewise lies in the projective absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical, directly underneath the absolute rest mass $\hat{m}_0^0$ in the absolute space $\hat{\Sigma}^0$, as already shown in Fig. 8(b).

By placing $\phi\hat{\rho}^0$ containing $\phi\hat{m}_0^0$ along the vertical in Fig. 8(b) along the vertical in Fig. 8(a) we have Fig. 9(a). And by placing $\phi\hat{\rho}$ containing $\phi\hat{m}_0$ along the horizontal in Fig. 8(a) along the horizontal in Fig. 8(b) we have Fig. 9(b).

Figs. 9(a) and 9(b) are Figs. 4(a) and 4(b) with the absolute rest masses of symmetry-partner particles in the absolute spaces and their 'projective' absolute intrinsic rest masses in absolute intrinsic spaces added. Figs. 9(a) and 9(b) arise at the first stage of the intrinsic coordinate projection and intrinsic mass 'projection' procedures used to derive them. There is a second stage of intrinsic mass 'projection', which corresponds to the second stage of intrinsic coordinate projection that was used to convert Figs. 4(a) and 4(b) to Figs. 6(a) and 6(b) earlier.

Now at the second stage of intrinsic mass 'projection', the 'one-dimensional' absolute intrinsic rest mass (or absolute nomass) $\phi\hat{m}_0^0$ in the 'one-dimensional' absolute intrinsic space $\phi\hat{\rho}^0$ along the vertical in Fig. 9(a) 'projects' a 'shadow' to be denoted by $\phi\hat{m}_{0h}^0$ into $\hat{\Sigma}$ along the horizontal, which is
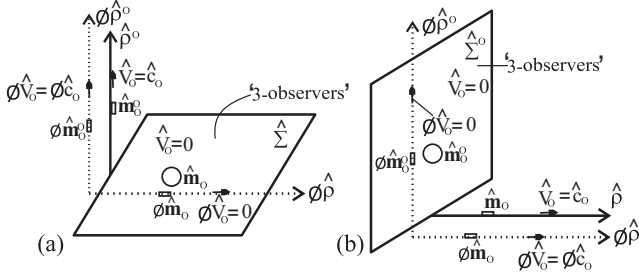
Fig. 9:

Fig. 10:

given by letting $\phi\hat{\psi} = \phi\hat{\psi}_0 = \phi\hat{\pi}/2$ and $\phi\hat{V} = \phi\hat{V}_0 = \phi\hat{c}_0$ in Eq. (5) as follows

$$\phi\hat{m}_{0h}^0 = \phi\hat{m}_0^0 \cos^2 \frac{\phi\hat{\pi}}{2} = \phi\hat{m}_0^0(1 - \frac{\hat{c}_0^2}{\hat{c}_0^2}) = 0 \qquad (10)$$

However it is the factor $\cos^2 \phi\hat{\pi}/2$ or $(1 - \phi\hat{c}_0^2/\phi\hat{c}_0^2)$ that vanishes in Eq. (10) and not $\phi\hat{m}_0^0$ that multiplies it. Thus let us re-write Eq. (10) as follows

$$\phi\hat{m}_{0h}^0 = \phi\hat{m}_0^0 \cos^2 \frac{\phi\hat{\pi}}{2} = 0 \times \phi\hat{m}_0^0 \equiv \phi\phi\hat{\hat{m}}_0 \qquad (11)$$

While Eq. (10) states that $\phi\hat{m}_0^0$ in $\phi\hat{\rho}^0$ along the vertical 'projects' absolute nothingness into $\hat{\Sigma}$ along the horizontal, Eq. (11) states that it projects a 'shadow' denoted by $\phi\phi\hat{\hat{m}}_0$ into $\hat{\Sigma}$. Any magnitude of $\phi\phi\hat{\hat{m}}_0$ is equivalent to zero magnitude of the absolute intrinsic rest mass $\phi\hat{m}_0^0$ in $\phi\hat{\rho}^0$ that 'projects' it, as follows from $\phi\phi\hat{\hat{m}}_0 \equiv 0 \times \phi\hat{m}_0^0$ in Eq. (11). Any magnitude of $\phi\phi\hat{\hat{m}}_0$ is consequently equivalent to zero magnitude of the absolute intrinsic rest mass $\phi\hat{m}_0$ in $\phi\hat{\rho}$. Hence $\phi\phi\hat{\hat{m}}_0$ is absolute and intrinsic with respect to the absolute intrinsic rest mass $\phi\hat{m}_0$ and hypothetical absolute-intrinsic-rest-mass-observers in $\phi\hat{\rho}$. It is consequently absolute-absolute intrinsic-intrinsic with respect to the absolute-rest-mass-observers in $\hat{\Sigma}$. It shall consequently be referred to as absolute-absolute intrinsic-intrinsic rest mass with respect to the absolute-rest-mass-observers in $\hat{\Sigma}$. Also since any magnitude of $\phi\phi\hat{\hat{m}}_0$ is zero (or no) magnitude of absolute nomass $\phi\hat{m}_0$, it shall be alternatively referred to as absolute-absolute nonomass with respect to the absolute-rest-mass-observers in $\hat{\Sigma}$.

The 'one-dimensional' absolute-absolute intrinsic-intrinsic rest mass (or absolute-absolute nonomass) $\phi\phi\hat{\hat{m}}_0$, will be located in the 'one-dimensional' absolute-absolute intrinsic-intrinsic space (or absolute-absolute nonospace) $\phi\phi\hat{\rho}$ projected underneath $\phi\hat{\rho}$ by $\phi\hat{\rho}^0$ in Fig. 5(a) or 6(a), directly underneath $\phi\hat{m}_0$ in $\phi\hat{\rho}$ along the horizontal, as illustrated in Fig.10(a). Likewise the symmetry-partner $\phi\phi\hat{\hat{m}}_0^0$ will be 'projected' into $\phi\phi\hat{\hat{\rho}}^0$ in Fig. 5(b) or Fig. 6(b), directly underneath $\phi\hat{m}_0^0$ in $\phi\hat{\rho}^0$ along the vertical, as illustrated in Fig.10(b).

The $\phi\phi\hat{\hat{\rho}}^0$ containing $\phi\phi\hat{\hat{m}}_0^0$ along the vertical in Fig. 10(b) must be added to Fig. 10(a) to have Fig. 11(a) and
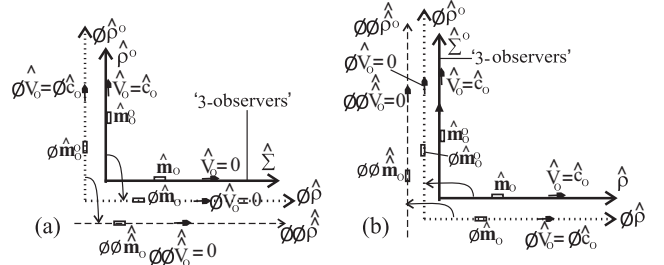
$\phi\phi\hat{\hat{\rho}}$ containing $\phi\phi\hat{\hat{m}}_0$ along the horizontal in Fig. 10(a) must be added to Fig. 10(b) to have Fig. 11(b) with respect to the indicated '3-observers'.
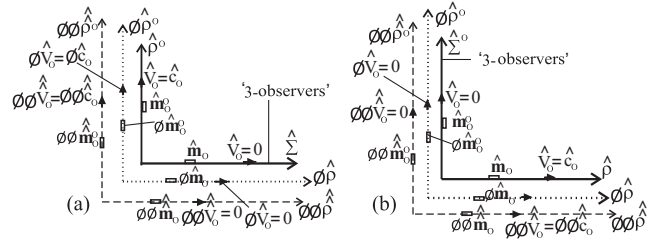

Fig. 11:

Finally $\hat{\rho}^0$, $\phi\hat{\rho}^0$ and $\phi\phi\hat{\hat{\rho}}^0$ containing $\hat{m}_0^0$, $\phi\hat{m}_0^0$ and $\phi\phi\hat{\hat{m}}_0^0$ respectively, must be changed to $\hat{c}\hat{t}$, $\phi\hat{c}\phi\hat{t}$ and $\phi\phi\hat{c}\phi\phi\hat{t}$ containing $\hat{\varepsilon}/\hat{c}^2 \, (\equiv \hat{m}_0)$, $\phi\hat{\varepsilon}/\phi\hat{c}^2 \, (\equiv \phi\hat{m}_0)$ and $\phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{c}^2 \, (\equiv \phi\phi\hat{\hat{m}}_0)$ respectively along the vertical in Fig. 11(a) to have Fig. 12(a) with respect '3-observers' in the absolute spaces in the positive (or our) universe and the negative universe.

Likewise $\hat{\rho}, \phi\hat{\rho}$ and $\phi\phi\hat{\hat{\rho}}$ containing $\hat{m}_0, \phi\hat{m}_0$ and $\phi\phi\hat{\hat{m}}_0$ must be changed to $\hat{c}\hat{t}^0$, $\phi\hat{c}\phi\hat{t}^0$ and $\phi\phi\hat{c}\phi\phi\hat{t}^0$ containing $\hat{\varepsilon}^0/\hat{c}^2$ $(\equiv \hat{m}_0^0), \phi\hat{\varepsilon}^0/\phi\hat{c}^2 \, (\equiv \phi\hat{m}_0^0)$ and $\phi\phi\hat{\hat{\varepsilon}}^0/\phi\phi\hat{c}^2 \, (\equiv \phi\phi\hat{\hat{m}}_0^0)$ respectively along the horizontal in Fig. 11(b) to have Fig. 12(b) with respect to '3-observers' in the absolute spaces in the positive time-universe and the negative time-universe.

As deduced earlier, the absolute speed $\hat{c}$ in the absolute time 'dimensions' $\hat{c}\hat{t}, -\hat{c}\hat{t}^*, \hat{c}\hat{t}^0$ and $-\hat{c}\hat{t}^{0*}$ in Figs. 12(a) and 12(b) is the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ of every point along the 'one-dimensional' absolute spaces $\hat{\rho}^0, -\hat{\rho}^{0*}, \hat{\rho}$ and $-\hat{\rho}^*$ respectively with respect to the indicated '3-observers' in Figs. 11(a) and 11(b). Consequently the absolute time 'dimensions' should actually be denoted by $\hat{c}_0\hat{t}, -\hat{c}_0\hat{t}^*, \hat{c}_0\hat{t}^0$ and $-\hat{c}_0\hat{t}^{0*}$ in Figs. 12(a) and 12(b). However we shall retain the notations $\hat{c}\hat{t}, -\hat{c}\hat{t}^*, \hat{c}\hat{t}^0$ and $-\hat{c}\hat{t}^{0*}$ as done in Figs. 12(a) and 12(b) for aesthetic reason, while noting that the absolute speed $\hat{c}$ in them is the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$, which is equivalent to zero absolute dynamical speed ($\hat{V}_d = 0$) and zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) with respect to the indicated '3-observers'.

The absolute intrinsic speed $\phi\hat{c}$ in the absolute intrinsic
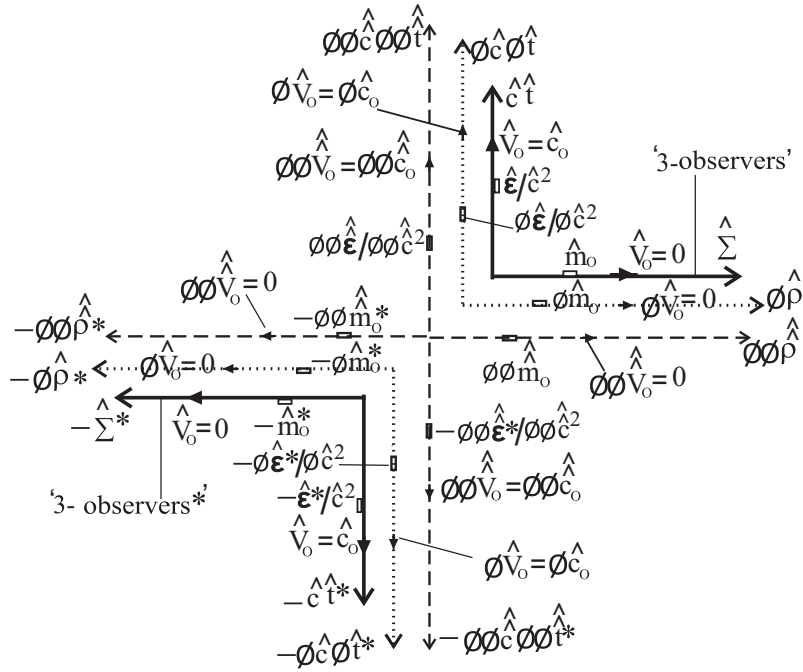
Fig. 12: a) Flat '4-dimensional' absolute spacetimes containing absolute rest masses of symmetry-partner particles underlied by flat '2-dimensional' absolute intrinsic spacetimes containing absolute intrinsic rest masses of the symmetry-partner particles underlied by flat '2-dimensional' absolute-absolute intrinsic-intrinsic spacetimes containing absolute-absolute intrinsic-intrinsic rest masses of the symmetry-partner particles in our universe and the negative universe.

Fig. 12: b) Flat '4-dimensional' absolute spacetimes containing absolute rest masses of symmetry-partner particles underlied by flat '2-dimensional' absolute intrinsic spacetimes containing absolute intrinsic rest masses of the symmetry-partner particles underlied by flat '2-dimensional' absolute-absolute intrinsic-intrinsic spacetimes containing absolute-absolute intrinsic-intrinsic rest masses of the symmetry-partner particles in the positive time-universe and the negative time-universe.
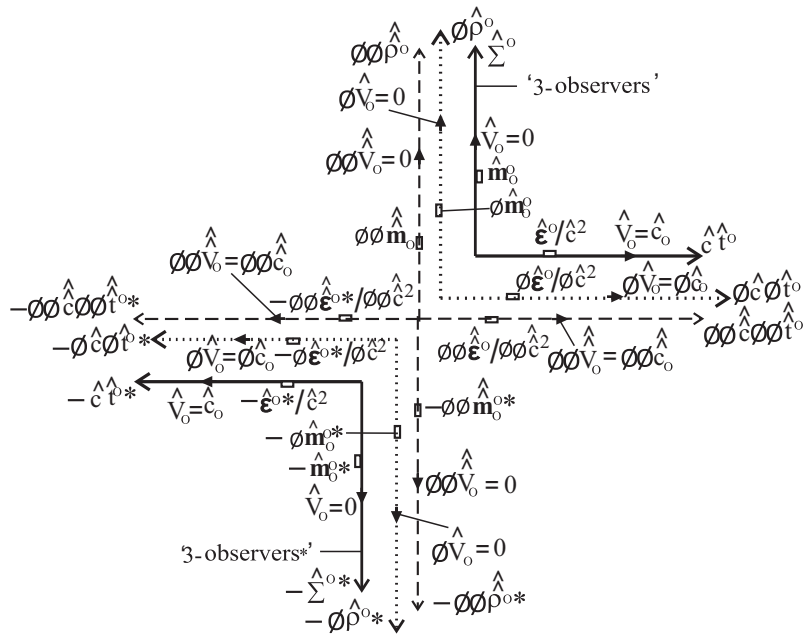
time 'dimensions' $\phi\hat{c}\phi\hat{t}$, $-\phi\hat{c}\phi\hat{t}^*$, $\phi\hat{c}\phi\hat{t}^0$ and $-\phi\hat{c}\phi\hat{t}^{0*}$ in Figs. 12(a) and 12(b) is the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ of every point along the 'one-dimensional' absolute intrinsic spaces $\phi\hat{\rho}^0$, $-\phi\hat{\rho}^{0*}$, $\phi\hat{\rho}$ and $-\phi\hat{\rho}^*$ respectively with respect to the indicated '3-observers' in Figs. 11(a) and 11(b). Consequently the absolute intrinsic time 'dimensions' should actually be denoted by $\phi\hat{c}_0\phi\hat{t}$, $-\phi\hat{c}_0\phi\hat{t}^*$, $\phi\hat{c}_0\phi\hat{t}^0$ and $-\phi\hat{c}_0\phi\hat{t}^{0*}$ in Figs. 12(a) and 12(b). However we shall retain the notations $\phi\hat{c}\phi\hat{t}$, $-\phi\hat{c}\phi\hat{t}^*$, $\phi\hat{c}\phi\hat{t}^0$ and $-\phi\hat{c}\phi\hat{t}^{0*}$ as done in Figs. 12(a) and 12(b) for aesthetic reason, while noting that the absolute intrinsic speed $\phi\hat{c}$ in them is the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$, which is equivalent to zero absolute intrinsic dynamical speed ($\phi\hat{V}_d = 0$) and zero absolute intrinsic gravitational speed ($\phi\hat{V}_g(\hat{r}) = 0$) with respect to the indicated '3-observers'.

The absolute-absolute intrinsic-intrinsic time 'dimensions' should actually be denoted by $\phi\phi\hat{\hat{c}}_0\phi\phi\hat{\hat{t}}$, $-\phi\phi\hat{\hat{c}}_0\phi\phi\hat{\hat{t}}^*$, $\phi\phi\hat{\hat{c}}_0\phi\phi\hat{\hat{t}}^0$ and $-\phi\phi\hat{\hat{c}}_0\phi\phi\hat{\hat{t}}^{0*}$ in Figs. 12(a) and 12(b), in order to show that the absolute-absolute intrinsic-intrinsic speed $\phi\phi\hat{\hat{c}}$ that appears in them is the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ of every point along the 'one-dimensional' absolute-absolute intrinsic-intrinsic spaces $\phi\phi\hat{\hat{\rho}}$, $-\phi\phi\hat{\hat{\rho}}^*$, $\phi\phi\hat{\hat{\rho}}^0$ and $-\phi\phi\hat{\hat{\rho}}^{0*}$ with respect to the indicated '3-observers' in Figs. 12(a) and 12(b). However we shall retain the notations $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$, $-\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^*$, $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^0$ and $-\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^{0*}$, as done in Fig. 12(a) and 12(b), while noting that the 'speed' $\phi\phi\hat{\hat{c}}$ that appears in them is the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$, which is equivalent to zero absolute-absolute intrinsic-intrinsic dynamical speed ($\phi\phi\hat{\hat{V}}_d = 0$) and zero absolute-absolute intrinsic-intrinsic gravitational speed ($\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}}) = 0$) with respect to the indicated '3-observers'.

It must also be noted that the absolute rest mass $\hat{m}_0^0$ in absolute space $\hat{\rho}^0$ acquires the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ at every point along $\phi\hat{\rho}^0$ with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 11(a). It is consequently an absolute-rest-mass-energy $\hat{\varepsilon} = \hat{m}_0^0\hat{c}_0^2$ with respect to '3-observers' in $\hat{\Sigma}$. The absolute rest mass $\hat{m}_0^0$ in $\hat{\rho}^0$ in Fig. 11(a) must be changed to equivalent absolute rest mass $\hat{\varepsilon}/\hat{c}_0^2$ ($\equiv \hat{m}_0$) in the absolute time 'dimension' $\hat{c}\hat{t}$ in Fig. 12(a). However we shall retain the notation $\hat{\varepsilon}/\hat{c}^2$, as done in Fig. 12(a), while noting that the absolute speed $\hat{c}$ that appears in in $\hat{\varepsilon}/\hat{c}^2$ is the absolute co-moving speed $\hat{V}_0 = \hat{c}_0$ that exists at every point along $\hat{c}\hat{t}$, which is equivalent to zero absolute dynamical speed ($\hat{V}_d = 0$) and zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) with respect to '3-observers' in $\hat{\Sigma}$. Consequently $\hat{\varepsilon}/\hat{c}^2$ retains the absolute material (i.e. absolute inertial and absolute gravitational) nature of the absolute rest mass $\hat{m}_0$ and is absolutely stationary dynamically in $\hat{c}\hat{t}$, with respect to its symmetry-partner $\hat{m}_0$ in $\hat{\Sigma}$, as well as the absolute rest masses of all other particles and bodies and all '3-observers' in $\hat{\Sigma}$.

It must likewise be noted that the absolute intrinsic speed $\phi\hat{c}$ that appears in the absolute-intrinsic-rest-mass-energy $\phi\hat{\varepsilon}/\phi\hat{c}^2$ ($\equiv \phi\hat{m}_0$), $-\phi\hat{\varepsilon}^*/\phi\hat{c}^2$ ($\equiv -\phi\hat{m}_0^*$), $\phi\hat{\varepsilon}^0/\phi\hat{c}^2$ ($\equiv \phi\hat{m}_0^0$) and $-\phi\hat{\varepsilon}^{0*}/\phi\hat{c}^2$ ($\equiv -\phi\hat{m}_0^{0*}$) in the absolute intrinsic time 'dimensions' $\phi\hat{c}\hat{t}$, $-\phi\hat{c}\phi\hat{t}^*$, $\phi\hat{c}\phi\hat{t}^0$ and $-\phi\hat{c}\phi\hat{t}^{0*}$ respectively in Figs.12(a) and 12(b), is absolute intrinsic co-moving speed, $\phi\hat{V}_0 = \phi\hat{c}_0$, which is equivalent to zero absolute intrinsic dynamical speed ($\phi\hat{V}_d = 0$) and zero absolute intrinsic gravitational speed ($\phi\hat{V}_g(\phi\hat{r}) = 0$). Consequently $\phi\hat{\varepsilon}/\phi\hat{c}^2$, in $\phi\hat{c}\phi\hat{t}$ retains the absolute intrinsic material (i.e. absolute intrinsic inertial and absolute intrinsic gravitational) nature of the absolute intrinsic rest mass $\phi\hat{m}_0$ in $\phi\hat{\rho}$ with respect to '3-observers' in $\hat{\Sigma}$. Likewise for $-\phi\hat{\varepsilon}^*/\phi\hat{c}^2$ in $-\phi\hat{c}\phi\hat{t}^*$ with respect to '3-observers' in $\hat{\Sigma}^*$ and $\phi\hat{\varepsilon}^0/\phi\hat{c}^2$ in $\phi\hat{c}\phi\hat{t}^0$ with respect to '3-observers' in $\hat{\Sigma}^0$ and $-\phi\hat{\varepsilon}^{0*}/\phi\hat{c}^2$ in $-\phi\hat{c}\phi\hat{t}^{0*}$ with respect to '3-observers' in $\hat{\Sigma}^{0*}$.

Finally it must be noted that the absolute-absolute intrinsic-intrinsic speed $\phi\phi\hat{\hat{c}}$ that appears in the equivalent absolute-absolute intrinsic-intrinsic rest masses $\phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2$, $-\phi\phi\hat{\hat{\varepsilon}}^*/\phi\phi\hat{\hat{c}}^2$, $\phi\phi\hat{\hat{\varepsilon}}^0/\phi\phi\hat{\hat{c}}^2$ and $-\phi\phi\hat{\hat{\varepsilon}}^{0*}/\phi\phi\hat{\hat{c}}^2$ in the absolute-absolute intrinsic-intrinsic time 'dimensions' $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$, $-\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^*$, $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^0$ and $-\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}^{0*}$ respectively in Figs. 12(a) and 12(b), is absolute-absolute intrinsic-intrinsic co-moving speed, $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$, which is equivalent to zero absolute-absolute intrinsic-intrinsic dynamical speed ($\phi\phi\hat{\hat{V}}_d = 0$) and zero absolute-absolute intrinsic-intrinsic gravitational speed ($\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}}) = 0$). Consequently $\phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2$ in $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ retains the nature of the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ in $\phi\phi\hat{\hat{\rho}}$ with respect to '3-observers' in $\hat{\Sigma}$.

The hierarchy of absolute spacetimes namely, absolute spacetime, absolute intrinsic spacetime (or absolute nospace-notime) and absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) and the corresponding hierarchy of absolute rest masses namely, absolute rest mass, absolute intrinsic rest mass (or absolute nomass) and absolute-absolute intrinsic-intrinsic rest mass (or absolute-absolute nonomass) exist in each of the four universes, as illustrated in Figs. 12(a) and 12(b) with the assumed absence of gravitational field and absence of absolute motion of the absolute rest masses of particles and objects in the universes. The absolute rest masses of the symmetry-partner objects in the absolute spaces in Figs. 12(a) and 12(b), must be assumed not to give rise to curvatures of the absolute intrinsic spacetimes (that is, not to give rise to absolute intrinsic Riemannian spacetime geometry). However this is impossible for symmetry-partner material objects no matter how small their absolute rest mass may be, as shall be found hereunder.

3 Three stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe

The derivations of absolute intrinsic spacetime containing absolute intrinsic rest mass (or absolute nospace-notime con-

taining absolute nomass) and absolute-absolute intrinsic-intrinsic spacetime containing absolute-absolute intrinsic-intrinsic rest mass (or absolute-absolute nonspace-nonotime containing absolute-absolute nonmass) in each of the four universes, by starting with absolute spacetimes containing the absolute rest masses of symmetry-partner particles or objects in the four universes above, give an impression that absolute spacetime containing absolute rest masses of particles and bodies are the created (or God-given) spacetime and mass in each universe. However this is a wrong impression.

In the natural evolutionary sequence of spacetime/intrinsic spacetime in a universe, an *ab initio* universe with flat '4-dimensional' absolute-absolute intrinsic-intrinsic spacetime $(\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{\hat{t}})$ containing absolute-absolute rest mass $(\hat{\hat{m}}_0, \hat{\hat{\varepsilon}}/\hat{\hat{c}}^2)$ of particles and bodies, which was underlied by flat 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ containing absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$, evolved into a universe filled with flat 'four-dimensional' absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$ containing absolute rest masses $(\hat{m}_0, \hat{\varepsilon}/\hat{c}^2)$ of particles and bodies underlied by flat 'two-dimensional' absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ containing the absolute intrinsic rest masses $(\phi\hat{m}_0, \phi\hat{\varepsilon}/\phi\hat{c}^2)$ of particles and bodies. This is the first stage of evolutionary sequence of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe

At the second stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe, the flat 'four-dimensional' absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$ containing absolute rest mass $(\hat{m}_0, \hat{\varepsilon}/\hat{c}^2)$ and its underlying flat 'two-dimensional' absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ containing absolute intrinsic rest mass $(\phi\hat{m}_0, \phi\hat{\varepsilon}/\phi\hat{c}^2)$, formed at the first stage, evolved into flat four-dimensional proper spacetime (Σ', ct') containing rest mass $(m_0, \varepsilon'/c^2)$ and its underlying flat two-dimensional proper intrinsic spacetime $(\phi\rho', \phi c\phi t')$ containing intrinsic rest mass $(\phi m_0, \phi\varepsilon'/\phi c^2)$.

And at the third (and final) stage of evolutions of spacetime/intrinsic spacetime and mass/intinsic mass in a universe, the flat four-dimensional proper spacetime (Σ', ct') containing rest mass $(m_0, \varepsilon'/c^2)$ and its underlying flat two-dimensional proper intrinsic spacetime $(\phi\rho', \phi c\phi t')$ containing intrinsic rest mass $(\phi m_0, \phi\varepsilon'/\phi c^2)$, formed at the second stage, evolved into flat four-dimensional relativistic spacetime (Σ, ct) containing relativistic mass $(m, \varepsilon/c^2)$ and its underlying flat two-dimensional relativistic intrinsic spacetime $(\phi\rho, \phi c\phi t)$ containing relativistic intrinsic mass $(\phi m, \phi\varepsilon/\phi c^2)$.

The natural three stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe are summarized in Table I. The first stage transforms the *ab initio* State 1 to State 2 of a universe; the second stage transforms State 2 to State 3 of a universe and the third stage transforms State 3 to the final State 4 of a universe, where the spacetimes/intrinsic spacetimes and masses/intrinsic masses in the four states of a universe are shown in Table I.

Now the absolute rest mass $\hat{m}_0$ of a particle or body possesses absolute gravitational and absolute inertial attributes. It is the source of absolute gravitational speed $\hat{V}_g(\hat{r})$ or absolute gravitational field $\hat{g}(\hat{r})$ and it can undergo absolute motion at an absolute dynamical speed $\hat{V}_d$. It is an absolute material entity (with absolute quantity of matter). The absolute intrinsic rest mass $\phi\hat{m}_0$ likewise possesses absolute intrinsic gravitational and absolute intrinsic inertial attributes. It is the source of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ and absolute intrinsic gravitational field $\phi\hat{g}(\phi\hat{r})$ and it can undergo absolute intrinsic motion at absolute intrinsic dynamical speed $\phi\hat{V}_d$. Hence $\phi\hat{m}_0$ is an absolute intrinsic material entity (or an absolute intrinsic quantity of matter).

The rest mass m_0 of a particle or body possesses gravitational and inertial attributes. It is the source of proper gravitational velocity $\vec{V}'_g(r')$ and proper (or classical) gravitational field $\vec{g}'(r')$ and it can move at relative dynamical velocity $\vec{v}$. It is consequently a relative material entity (or relative quantity of matter). The intrinsic rest mass ϕm_0 likewise possesses intrinsic gravitational and intrinsic inertial attributes. It is the source of proper intrinsic gravitational speed $\phi V'_g(\phi r')$ and proper (or classical) intrinsic gravitational field $\phi g'(\phi r')$ and it can undergo relative intrinsic motion at a relative intrinsic dynamical speed ϕv. Hence ϕm_0 is a relative intrinsic material entity (or relative intrinsic quantity of matter).

The relativistic mass m of a particle or body in column 4 of Table I (to be identified as the inertial mass and passive gravitational mass elsewhere with further development), is likewise a relative material entity (or relative quantity of matter). And so is the relativistic intrinsic mass ϕm a relative intrinsic material entity (or relative intrinsic quantity of matter).

The absolute rest mass is at the lowest level of the hierarchy of masses (or matter), that is, the lowest level in the hierarchy of absolute rest mass $\hat{m}_0$, followed by rest mass m_0, followed by relativistic (or inertial) mass m, in the ascending order. The reason is that any quantity of absolute rest mass $\hat{m}_0$ is equivalent to zero quantity of rest mass m_0 and zero quantity of relativistic (or inertial) mass m. Quantity of rest mass and quantity of inertial mass are what Isaac Newton defined as quantity of matter in the *Principia* [10]. It then follows that any quantity of absolute rest mass is equivalent to zero quantity of matter. No quantity of matter is lower than zero quantity of matter, consequently the absolute rest mass ('the zero point of the 'matter-line') is the lowest level of matter in a universe. The absolute intrinsic rest mass is likewise at the lowest level of the hierarchy of intrinsic rest masses, that is at the lowest level of absolute intrinsic rest mass $\phi\hat{m}_0$, followed by intrinsic rest mass ϕm_0, followed by relativistic intrinsic mass (or intrinsic inertial mass) ϕm, in the ascending order.

Now any magnitude of absolute-absolute rest mass $\hat{\hat{m}}_0$ is equivalent to zero magnitude of absolute rest mass $\hat{m}_0$ (or any magnitude of absolute-absolute matter is equivalent to zero magnitude of absolute matter). It then follows that the absolute-absolute rest mass is immaterial, since the absolute rest mass is the lowest state of matter. Any magnitude of absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ is equivalent to zero magnitude of absolute intrinsic rest mass $\phi\hat{m}_0$ (or any magnitude of absolute-absolute intrinsic-intrinsic matter is equivalent to zero magnitude of absolute intrinsic matter). It follows that the absolute-absolute intrinsic-intrinsic rest mass is an absolute intrinsic immaterial entity, since absolute intrinsic rest mass

Immaterial	Material		
State 1	State 2	State 3	State 4
$(\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{t}\,; \hat{\hat{m}}_0\,)$	$(\hat{\Sigma}, \hat{c}\hat{t}\,; \hat{m}_0\,)$	$(\Sigma', ct'\,; m_0\,)$	$(\Sigma, ct\,; m)$
	$(\phi\hat{\rho}\,, \phi\hat{c}\phi\hat{t}\,; \phi\hat{m}_0\,)$	$(\phi\rho'\,, \phi c\phi t'\,; \phi m_0\,)$	$(\phi\rho\,, \phi c\phi t\,; \phi m)$
$(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}};$ $\phi\phi\hat{\hat{m}}_0\,)$	$(\phi\phi\hat{\rho}, \phi\phi\hat{c}\phi\phi\hat{t};$ $\phi\phi\hat{m}_0\,)$	$(\phi\phi\hat{\rho}, \phi\phi\hat{c}\phi\phi\hat{t};$ $\phi\phi\hat{m}_0\,)$	$(\phi\phi\hat{\rho}, \phi\phi\hat{c}\phi\phi\hat{t};$ $\phi\phi\hat{m}_0\,)$

is the lowest state of intrinsic matter.

As follows from the foregoing five paragraphs, State 2, State 3 and State 4 of a universe in Table 1, constitute three levels of the hierarchy of matter/intrinsic matter or are the material states of a universe, as indicated in the table. A universe is filled with material particles and objects in spacetime and intrinsic material particles and objects in intrinsic spacetime in State 2, State 3, and State 4. Laws of gravity, laws of motion and other natural laws involving material particles and objects are possible in State 2, State 3 and State 4, although they take on different forms in these states.

As indicated in Table I, State 1 of a universe was an immaterial *ab initio* state in which a universe was filled with immaterial absolute-absolute rest masses $(\hat{\hat{m}}_0, \hat{\hat{\varepsilon}}/\hat{\hat{c}}^2)$ of particles in flat 'four-dimensional' absolute-absolute spacetime $(\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{t})$, which was underlied by flat 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ containing the absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0\,, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of the particles, with respect to hypothetical immaterial '3-observers' in the absolute-absolute space $\hat{\hat{\Sigma}}$ in the universe at that epoch. The present material universes had evolved from the *ab initio* immaterial universes.

Now the material absolute rest mass $\hat{M}_0$ is the source of absolute gravitational speed $\hat{V}_g(\hat{r})$, absolute gravitational potential $\hat{\Phi}(\hat{r})$ and absolute gravitational field $\hat{g}(\hat{r})$ in the absolute space $\hat{\Sigma}$ and the absolute intrinsic rest mass $\phi\hat{M}_0$ is the source of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$, absolute intrinsic gravitational potential $\phi\hat{\Phi}(\phi\hat{r})$ and absolute intrinsic gravitational field $\phi\hat{g}(\phi\hat{r})$ in absolute intrinsic space $\phi\hat{\rho}$.

The absolute gravitational speed $\hat{V}_g(\hat{r})$ is at the lowest level of the hierarchy of gravitational speeds that can be associated with a gravitational field source. That is, lowest level in the hierarchy of absolute gravitational speed $\hat{V}_g(\hat{r})$ in $\hat{\Sigma}$, followed by proper gravitational speed $V_g'(r')$ in Σ', followed by relativistic gravitational speed $V_g(r)$ in Σ, in the ascending order, (although $V_g'(r')$ and $V_g(r)$ are equivalent). The absolute gravitational potential is the lowest level in the hierarchy of the gravitational potentials that can be associated with a gravitational field source. That is, the lowest level in the hierarchy of absolute gravitational potential $\hat{\Phi}(\hat{r})$, followed by proper (or classical) gravitational potential $\Phi'(r')$, followed by relativistic gravitational potential $\Phi(r)$, in the ascending order. And absolute gravitational field is the lowest level in the hierarchy of gravitational fields that can be associated with a gravitational field source. That is, the lowest level in the hierarchy of absolute gravitational field $\hat{g}(\hat{r})$, followed by proper (or classical) gravitational field $g'(r')$, followed by relativistic gravitational field $g(r)$, in the ascending order.

The absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ is at the lowest level in the hierarchy of intrinsic gravitational speeds that can be associated with a gravitational field source. That is, lowest level in the hierarchy of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ in $\phi\hat{\rho}$, followed by proper intrinsic gravitational speed $\phi V_g'(\phi r')$ in $\phi\rho'$, followed by relativistic intrinsic gravitational speed $\phi V_g(\phi r)$ in $\phi\rho$, in the ascending order, (although $\phi V_g'(\phi r')$ and $\phi V_g(\phi r)$ are equivalent). The absolute intrinsic gravitational potential is the lowest level in the hierarchy of intrinsic gravitational potentials that can be associated with a gravitational field source. That is, the lowest level in the hierarchy of absolute intrinsic gravitational potential $\phi\hat{\Phi}(\phi\hat{r})$, followed by proper (or classical) intrinsic gravitational potential $\phi\Phi'(\phi r')$, followed by relativistic intrinsic gravitational potential $\phi\Phi(\phi r)$, in the ascending order. And absolute intrinsic gravitational field is the lowest level in the hierarchy of intrinsic gravitational fields that can be associated with a gravitational field source. That is, the lowest level in the hierarchy of absolute intrinsic gravitational field $\phi\hat{g}(\phi\hat{r})$, followed by proper (or classical) intrinsic gravitational field $\phi g'(\phi r')$, followed by relativistic intrinsic gravitational field $\phi g(\phi r)$, in the ascending order.

Any magnitude of absolute-absolute gravitational speed $\hat{\hat{V}}_g(\hat{\hat{r}})$ in absolute-absolute space $\hat{\hat{\Sigma}}$ is equivalent to zero magnitude of absolute gravitational speed $\hat{V}_g(\hat{r})$ in absolute space $\hat{\Sigma}$. It then follows that absolute-absolute gravitational speed is not part of the hierarchy of gravitational speeds, since absolute gravitational speed is at the lowest level of the hierarchy of gravitational speeds. The absolute-absolute gravitational potential $\hat{\hat{\Phi}}(\hat{\hat{r}})$ is likewise not part of the hierarchy of gravitational potentials, since absolute gravitational potential $\hat{\Phi}(\hat{r})$ is at the lowest level of the hierarchy of gravitational potentials. And absolute-absolute gravitational field $\hat{\hat{g}}(\hat{\hat{r}})$ is not part of the hierarchy of gravitational fields, since absolute gravitational field $\hat{g}(\hat{r})$ is at the lowest level of the hierarchy of gravitational fields.

Any magnitude of absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ is equivalent to zero magnitude of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ in absolute intrinsic space $\phi\hat{\rho}$. It then follows that absolute-absolute intrinsic-intrinsic gravitational speed is not part of the hierarchy of intrinsic gravitational speeds, since absolute intrinsic gravitational speed is at the lowest level of the hierarchy of intrinsic gravitational speeds. The absolute-absolute intrinsic-intrinsic gravitational potential $\phi\phi\hat{\hat{\Phi}}(\phi\phi\hat{\hat{r}})$ is likewise not part of the hierarchy of intrinsic gravitational potentials, since absolute intrinsic

gravitational potential $\phi\hat{\bar{\Phi}}(\phi\hat{r})$ is at the lowest level of the hierarchy of intrinsic gravitational potentials. And absolute-absolute intrinsic-intrinsic gravitational field $\phi\phi\hat{\bar{g}}(\phi\phi\hat{\bar{r}})$ is not part of the hierarchy of intrinsic gravitational fields, since absolute intrinsic gravitational field $\phi\hat{g}(\phi\hat{r})$ is at the lowest level of the hierarchy of intrinsic gravitational fields.

Hierarchy of theories of gravity due to the hierarchy of material sources $\hat{M}_0$ in $\hat{\Sigma}$, M_0 in Σ' and M in Σ, does not extend to the immaterial absolute-absolute rest mass $\hat{\bar{M}}_0$ in $\hat{\bar{\Sigma}}$ and hierarchy of theories of intrinsic gravity does not extend to the immaterial absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\bar{M}}_0$ in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\bar{\rho}}$. In other words, if we allow $\hat{\bar{M}}_0$ to be the source of non-uniform absolute-absolute gravitational speed $\hat{\bar{V}}_g(\hat{\bar{r}})$ and non-uniform absolute-absolute gravitational potential $\hat{\bar{\Phi}}(\hat{\bar{r}})$ in $\hat{\bar{\Sigma}}$, the theory of absolute-absolute gravity (AAG) associated with $\hat{\bar{V}}_g(\hat{\bar{r}})$, $\hat{\bar{\Phi}}(\hat{\bar{r}})$ and $\hat{\bar{g}}(\hat{\bar{r}})$ in $\hat{\bar{\Sigma}}$ is not part of the hierarchy of the theories of gravity with respect to observers in spacetime, since the theory of absolute gravity (AG) associated with the absolute gravitational parameters $\hat{V}_g(\hat{r})$, $\hat{\Phi}(\hat{r})$ and $\hat{g}(\hat{r})$ in absolute space $\hat{\Sigma}$, is at the lowest level of the hierarchy of theories of gravity in hierarchy of spacetimes.

Likewise if we allow $\phi\phi\hat{\bar{M}}_0$ to be the source of non-uniform absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{\bar{V}}_g(\phi\phi\hat{\bar{r}})$ and non-uniform absolute-absolute intrinsic-intrinsic gravitational potential $\phi\phi\hat{\bar{\Phi}}(\phi\phi\hat{\bar{r}})$ in $\phi\phi\hat{\bar{\rho}}$, the theory of absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG) associated with $\phi\phi\hat{\bar{V}}_g(\phi\phi\hat{\bar{r}})$, $\phi\phi\hat{\bar{\Phi}}(\phi\phi\hat{\bar{r}})$ and $\phi\phi\hat{\bar{g}}(\phi\phi\hat{\bar{r}})$ in $\phi\phi\hat{\bar{\rho}}$ is not part of the hierarchy of the theories of intrinsic gravity with respect to observers in spacetime, since the theory of absolute intrinsic gravity (ϕAG) associated with the absolute intrinsic gravitational parameters $\phi\hat{V}_g(\phi\hat{r})$, $\phi\hat{\Phi}(\phi\hat{r})$ and $\phi\hat{g}(\phi\hat{r})$ in absolute intrinsic space $\phi\hat{\rho}$, is at the lowest level of theories of intrinsic gravity in hierarchy of intrinsic spacetimes.

The theory of absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG) associated with $\phi\phi\hat{\bar{V}}_g(\phi\phi\hat{\bar{r}})$, $\phi\phi\hat{\bar{\Phi}}(\phi\phi\hat{\bar{r}})$ and $\phi\phi\hat{\bar{g}}(\phi\phi\hat{\bar{r}})$ that originate from $\phi\phi\hat{\bar{M}}_0$ in $\phi\phi\hat{\bar{\rho}}$, not being in the fold of the theories of intrinsic gravity, cannot cause the effects produced by the theories of intrinsic gravity namely, the theory of absolute intrinsic gravity (ϕAG) associated with the absolute intrinsic gravitational parameters $\phi\hat{V}_g(\phi\hat{r})$, $\phi\hat{\Phi}(\phi\hat{r})$ and $\phi\hat{g}(\phi\hat{r})$ that originate from the absolute intrinsic rest mass $\phi\hat{M}_0$ in the absolute intrinsic space $\phi\hat{\rho}$ and the theory of proper (or classical) intrinsic gravity (ϕCG$'$) associated with the proper intrinsic gravitational parameters $\phi V_g'(\phi r')$, $\phi\Phi'(\phi r')$ and $\phi g'(\phi r')$ that originate from the intrinsic rest mass ϕM_0 in the proper intrinsic space $\phi\rho'$.

For instance, while the presence of non-uniform absolute intrinsic gravitational speeds $\phi\hat{V}_g(\phi\hat{r})$ (or the presence of ϕAG) on an initially flat 'two-dimensional' absolute intrinsic spacetime ($\phi\hat{\rho}, \phi\hat{c}\phi\hat{t}$) will give rise to curved ($\phi\hat{\rho}, \phi\hat{c}\phi\hat{t}$) at the first stage of evolution of spacetime/intrinsic spacetime in a gravitational field and the presence of non-uniform proper intrinsic gravitational speed $\phi V_g'(\phi r')$ of intrinsic classical gravity (ϕCG$'$) on an initially flat proper intrinsic spacetime ($\phi\rho', \phi c\phi t'$) will give rise to curved ($\phi\rho', \phi c\phi t'$) at the second stage of evolution of spacetime/intrinsic spacetime in a gravitational field, as has been well developed in [6–8], the

presence of non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds $\phi\phi\hat{\bar{V}}_g(\phi\phi\hat{\bar{r}})$ (or the presence of $\phi\phi$AAG) on flat absolute-absolute intrinsic-intrinsic spacetime ($\phi\phi\hat{\bar{\rho}}, \phi\phi\hat{\bar{c}}\phi\phi\hat{\bar{t}}$) cannot cause the curvature of ($\phi\phi\hat{\bar{\rho}}, \phi\phi\hat{\bar{c}}\phi\phi\hat{\bar{t}}$). Consequently the 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime ($\phi\phi\hat{\bar{\rho}}, \phi\phi\hat{\bar{c}}\phi\phi\hat{\bar{t}}$) remains flat always, even with the presence of the absolute-absolute intrinsic-intrinsic rest masses of all gravitational field sources in the universe, giving rise to absolute-absolute intrinsic-intrinsic gravitation fields of $\phi\phi$AAG in it. That is, it remains flat at State 1, State 2, State 3 and State 4 of a universe in Table I and consequently at the first and second stages of evolution of spacetime/intrinsic spacetime in every gravitational field.

It follows from the foregoing that the absolute-absolute phenomenon in absolute-absolute spacetime ($\hat{\bar{\Sigma}}, \hat{\bar{c}}\hat{\bar{t}}$) and the absolute-absolute intrinsic-intrinsic phenomenon in the underlying absolute-absolute intrinsic-intrinsic spacetime ($\phi\phi\hat{\bar{\rho}}, \phi\phi\hat{\bar{c}}\phi\phi\hat{\bar{t}}$), which caused the evolution of the immaterial State 1 to material State 2 of a universe in Table I, that is, which supports the first stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe, was not absolute-absolute gravity (AAG) in ($\hat{\bar{\Sigma}}, \hat{\bar{c}}\hat{\bar{t}}$) and absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG) in ($\phi\phi\hat{\bar{\rho}}, \phi\phi\hat{\bar{c}}\phi\phi\hat{\bar{t}}$). The absolute-absolute phenomenon and its underlying absolute-absolute intrinsic-intrinsic phenomenon responsible for the first stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe shall be investigated elsewhere when the present theory eventually incorporates cosmological model.

The absolute dynamical speed $\hat{V}_d$ is at the lowest level of hierarchy of dynamical speeds that a material particle or object can possess, that is, lowest level in the hierarch of absolute dynamical speed $\hat{V}_d$ possessed by the absolute rest mass $\hat{m}_0$ in the absolute space $\hat{\Sigma}$, followed by relative proper dynamical speed v' possessed by the rest mass m_0 in the proper Euclidean 3-space Σ', followed by the relativistic dynamical speed v possessed by the relativistic (or inertial) mass m in the relativistic Euclidean 3-space Σ, in the ascending order, although v' and v are equivalent.

The absolute intrinsic dynamical speed $\phi\hat{V}_d$ is likewise at the lowest level of the hierarchy of intrinsic dynamical speeds, that is, at the lowest level in the hierarchy of $\phi\hat{V}_d$ possessed by the absolute intrinsic rest mass $\phi\hat{m}_0$ in absolute intrinsic space $\phi\hat{\rho}$, followed by relative proper intrinsic dynamical speed $\phi v'$ possessed by the intrinsic rest mass ϕm_0 in the proper intrinsic space $\phi\rho'$, followed by the relativistic intrinsic dynamical speed v possessed by the relativistic intrinsic mass (or intrinsic inertial mass) m in relativistic intrinsic space $\phi\rho$, in the ascending order, although $\phi v'$ and ϕv are equivalent.

Any magnitude of absolute-absolute dynamical speed $\hat{\bar{V}}_d$ in $\hat{\bar{\Sigma}}$ is equivalent to zero magnitude of absolute dynamical speed $\hat{V}_d$ in absolute space $\hat{\Sigma}$. It follows that $\hat{V}_d$ is not in the fold of dynamical speeds, since $\hat{V}_d$ is at the lowest level of the hierarchy of dynamical speeds. Any magnitude of absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\bar{V}}_d$ in $\phi\phi\hat{\bar{\rho}}$ is equivalent to zero magnitude of absolute intrinsic dynamical speed $\phi\hat{V}_d$ in absolute intrinsic space $\phi\hat{\rho}$. It follows that $\phi\phi\hat{\bar{V}}_d$ is not in the fold of intrinsic dynamical speeds, since $\phi\hat{V}_d$ is at the lowest level of the hierarchy of intrinsic dynamical speeds.

Hierarchy of theories of motion does not extend to the immaterial absolute-absolute rest masses $\hat{\hat{m}}_0$ of particles and objects in the absolute-absolute space $\hat{\hat{\Sigma}}$ and hierarchy of theories of intrinsic motion does not extend to the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ of particles and objects in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$. In other words, if we allow $\hat{\hat{m}}_0$ to possess absolute-absolute dynamical speed $\hat{\hat{V}}_d$ and possibly absolute-absolute dynamical acceleration $\hat{\hat{a}}$ in $\hat{\hat{\Sigma}}$, the theory of absolute-absolute motion (AAM) associated with $\hat{\hat{V}}_d$ and $\hat{\hat{a}}$ in $\hat{\hat{\Sigma}}$ is not in the fold of the theories of motion, since it is lower in hierarchy than the theory of absolute motion (AM) at the lowest level of the hierarchy of the theories of motion.

Likewise if we allow $\phi\phi\hat{\hat{m}}_0$ to possess absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ and absolute-absolute intrinsic-intrinsic acceleration $\phi\phi\hat{\hat{a}}$ in $\phi\phi\hat{\hat{\rho}}$, the theory of absolute-absolute intrinsic-intrinsic motion ($\phi\phi$AAM) associated with $\phi\phi\hat{\hat{V}}_d$ and $\phi\phi\hat{\hat{a}}$ in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ is not in the fold of the theories of intrinsic motion, since it is lower in hierarchy than the theory of absolute intrinsic motion (ϕAM) in $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ at the lowest level of the hierarchy of the theories of intrinsic motion.

The theory of absolute-absolute intrinsic-intrinsic motion ($\phi\phi$AAM) associated with $\phi\phi\hat{\hat{V}}_d$ and $\phi\phi\hat{\hat{a}}$ possessed by $\phi\phi\hat{\hat{m}}_0$ in $\phi\phi\hat{\hat{\rho}}$, not being in the fold of the theories of intrinsic motion, cannot cause the effects produced by the theories of intrinsic motion namely, the theory of absolute intrinsic motion (ϕAM) associated with $\phi\hat{V}_d$ and $\phi\hat{a}$, possessed by $\phi\hat{m}_0$ in absolute intrinsic space $\phi\hat{\rho}$, the theory of intrinsic classical mechanics (ϕCM$'$) associated with $\phi v'$ and $\phi a'$ possessed by intrinsic rest mass ϕm_0 in the proper intrinsic space $\phi\rho'$ and theory of relativistic intrinsic motion (or intrinsic special theory of relativity) (ϕSR) associated with ϕv and ϕa possessed by intrinsic relativistic mass ϕm in the relativistic intrinsic space $\phi\rho$.

For instance, absolute intrinsic dynamical speed $\phi\hat{V}_d$ (or ϕAM) on a flat absolute intrinsic metric space $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$ will give rise to inclination of the little absolute intrinsic metric spacetime interval $(d\phi\hat{\rho}, \phi\hat{c}d\phi\hat{t})$ contained within the absolute intrinsic rest mass $(\phi\hat{m}_0, \phi\hat{\varepsilon}/\phi\hat{c}^2)$ relative to the projective little proper intrinsic metric spacetime interval $(d\phi\rho', \phi cd\phi t')$ contained within the intrinsic rest mass $(\phi m_0, \phi\varepsilon'/\phi c^2)$ of the particle or body, at the first stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in the context of dynamics. Relative intrinsic dynamical speed ϕv (or ϕCM') will likewise give rise to the inclination of the little proper intrinsic metric spacetime interval $(d\phi\rho', \phi cd\phi t')$ contained within the intrinsic rest mass $(\phi m_0, \phi\varepsilon'/\phi c^2)$ relative to the little relativistic intrinsic metric spacetime interval $(d\phi\rho, \phi cd\phi t)$ contained within the special-relativistic intrinsic mass $(\phi\gamma(\phi v)\phi m_0, \phi\gamma(\phi v)\phi\varepsilon'/\phi c^2)$ of the particle or body at the second stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in the context of dynamics. There are two stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass, which is but limited to the interior of the particle or body in motion in the context of dynamics, which shall be developed with progress of the present theory.

On the other hand, the possession of $\phi\phi\hat{\hat{V}}_d$ by $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ on flat $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ in the context of $\phi\phi$AAM cannot give rise to inclination of little absolute-absolute intrinsic-intrin-

sic metric spacetime interval $(d\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}d\phi\phi\hat{\hat{t}})$ contained within $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of the particle or body. Consequently the little 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime $(d\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}d\phi\phi\hat{\hat{t}})$ containing $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of every particle or body remains not inclined always. That is $d\phi\phi\hat{\hat{\rho}}$ remains along the straight line universal $\phi\phi\hat{\hat{\rho}}$ along the horizontal and $\phi\phi\hat{\hat{c}}d\phi\phi\hat{\hat{t}}$ remains along the straight line universal $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ along the vertical always for all possible absolute-absolute intrinsic-intrinsic dynamical speeds $\phi\phi\hat{\hat{V}}_d$ of $\phi\phi\hat{\hat{m}}_0$ in $\phi\phi\hat{\hat{\rho}}$. This means they remain so at State 1, State 2, State 3 and State 4 of a universe and consequently at the first and second stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in the context of dynamics within or outside a gravitational field.

As shall be explained elsewhere with further development, the universal 'two-dimensional' absolute-absolute intrinsic-intrinsic metric spacetime, $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$, which is always flat and the little absolute-absolute intrinsic-intrinsic metric spacetime interval $(d\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}d\phi\phi\hat{\hat{t}})$ contained within the absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of every particle or body in the universe, which is always flat, that is, $d\phi\phi\hat{\hat{\rho}}$ remains along the straight line universal $\phi\phi\hat{\hat{\rho}}$ along the horizontal and $\phi\phi\hat{\hat{c}}d\phi\phi\hat{\hat{t}}$ remains along the straight line universal $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ along the vertical always, even when $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ possesses absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ of any magnitude at the immaterial *ab initio* State 1 of a universe, persists to the material State 2, State 3 and State 4 of a universe.

Associated with each of the three stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe summarized in Table I, is a spacetime/intrinsic spacetime geometry that cuts across the entire universe. The sequence of cosmological spacetime/intrinsic spacetime geometries associated with the three stages of spacetime/intrinsic spacetime and mass/intrinsic mass within a universe, shall be developed elsewhere upon propagating the present theory to the level of cosmological model.

The gravitational field sources located within a universe cause evolution of spacetime/intrinsic spacetime and parameters/intrinsic parameters within their fields in their local regions of spacetime within the universe. However absolute-absolute gravity and absolute intrinsic-intrinsic gravity that are present at State 1 of a universe do not participate in the evolution of spacetime/intrinsic spacetime and parameters/intrinsic parameters at the first stage of evolutions of spacetime/intrinsic spacetime and parameters/intrinsic parameters (that transforms State 1 into State 2 of a universe), as discussed earlier in this section. It is only at the second and third stages of evolutions of spacetime/intrinsic spacetime and parameters/intrinsic parameters in a universe that absolute gravity/absolute intrinsic gravity gravity participate (at the second stage) and relative gravity/relative intrinsic gravity participate (at the third stage).

Thus the second stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe, which transforms State 2 into State 3 of a universe in Table I, corresponds to the first stage of evolution of spacetime/intrinsic spacetime and mass/intrinsic mass in gravitational fields, while the third stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe, which transforms State 3 to State 4 of a universe in Table I, corresponds to the second stage of evolutions of spacetime/intrinic spacetime and mass/intrinsic mass in a gravitational fields. As has
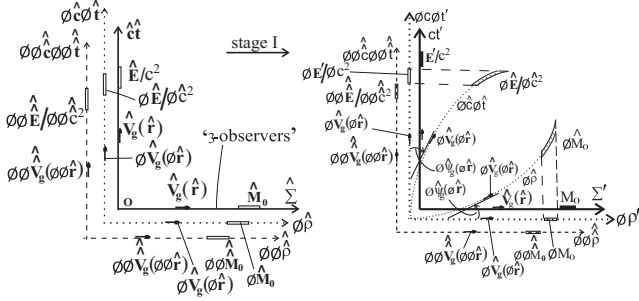
Fig. 13: (a) First stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a gravitational field.
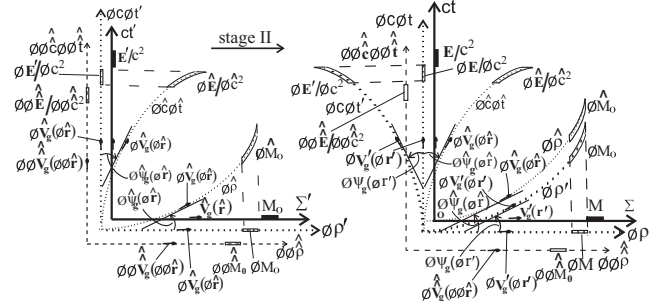

Fig. 13: (b) Second stage of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a gravitational field.

been identified in [5–8], the spacetime/intrinsic spacetime geometries associated with the first and second stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass at the exterior of a gravitational field are depicted in Figs. 13(a) and 13(b).

Except for the incorporation of the constantly flat 'two-dimensional' absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ containing the absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$, isolated newly in this paper, into the diagrams of Figs. 13(a) and 13(b), there is nothing new about those diagrams. They have been developed within a long-range metric force field in general within an elaborate programme in [5–7] and adapted to the gravitational field in [8]. Observe that the diagram at the right-hand side in Fig. 13(a) is positive universe portion of Fig. 5 of [8] and the diagram at the right-hand side in Fig. 13(b) is positive universe portion of Fig. 7 of [8]. The point being emphasized here is that the constantly flat absolute-absolute intrinsic-intrinsic spacetime $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ containing absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of particles and bodies that existed at the *ab initio* immaterial State 1 of a universe in Table I, persists to State 2, State 3 and State 4 of a universe. It is hence present within every universe at present.

The absolute-absolute intrinsic-intrinsic rest mass (or absolute-absolute nonomass) $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$ of particles and bodies in flat absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonospace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ underlying the relativistic mass $(m, \varepsilon/c^2)$ in flat four-dimensional relativistic spacetime (Σ, ct) and relativistic intrinsic mass $(\phi m, \phi\varepsilon/\phi c^2)$ in flat two-dimensional relativistic intrinsic spacetime $(\phi\rho, \phi c\phi t)$ is very passive. It does not participate in gravitational interaction/intrinsic gravitational interaction and motion/intrinsic motion within a universe; these being the exclusive preserves of the absolute intrinsic rest mass $(\phi\hat{m}_0, \phi\hat{\varepsilon}/\phi\hat{c}^2)$ on curved 'two-dimensional' absolute intrinsic spacetime $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t})$, intrinsic rest mass $(\phi m_0, \phi\varepsilon'/\phi c^2)$ on curved two-dimensional proper intrinsic spacetime $(\phi\rho', \phi c\phi t')$, relativistic intrinsic mass $(\phi m, \phi\varepsilon/\phi c^2)$ on flat relativistic intrinsic spacetime $(\phi\rho, \phi c\phi t)$ and relativistic mass $(m, \varepsilon/c^2)$ on flat spacetime (Σ, ct). The absolute-absolute intrinsic-intrinsic rest mass $(\phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2)$, in absolute-absolute intrinsic-intrinsic spacetime $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ just lies there idle.

Although the situation described in the foregoing paragraph exists, it must be remembered that the absolute-absolute intrinsic-in-

trinsic gravitational speed $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and absolute-absolute intrinsic-intrinsic gravitational potential $\phi\phi\hat{\hat{\Phi}}(\phi\phi\hat{\hat{r}})$ that originate from $\phi\phi\hat{\hat{M}}_0$ in $\phi\phi\hat{\hat{r}}$ give rise to the theory of absolute-absolute intrinsic-intrinsic gravity ($\phi\phi$AAG) in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$, but which does not alter the flatness of $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ for any magnitude of $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ in $0 \le \phi\phi hat{\hat{V}}_g(\phi\phi\hat{\hat{r}}) \le \infty$. The possession of absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ of a particle or body, likewise gives rise to the theory of absolute-absolute intrinsic-intrinsic motion ($\phi\phi$AAM) in $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$, which does not affect the flatness of $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ for any magnitude of $\phi\phi\hat{\hat{V}}_d$ in the range $0 \le \phi\phi\hat{\hat{V}}_d \le \infty$. The $\phi\phi$AAG and $\phi\phi$AAM cannot be discountenanced or wholly glossed over. They shall be developed elsewhere with further development and their significance shown.

3.1 The highest and lowest levels of the hierarchy of spacetime/intrinsic spacetime in a universe

Finally in this section, the question may arise, why not extend the first and second stages of the intrinsic coordinate projection and intrinsic mass 'projection' procedures used to derive absolute intrinsic spacetime; absolute intrinsic rest mass (or absolute nospace-notime; absolute nomass) $(\phi\hat{\rho}, \phi\hat{c}\phi\hat{t}; \phi\hat{m}_0)$ at the first stage of the procedure and absolute-absolute intrinsic-intrinsic spacetime; absolute-absolute intrinsic-intrinsic rest mass (or absolute-absolute nonospace-nonotime; absolute-absolute nonomass) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}; \phi\phi\hat{\hat{m}}_0)$ at the second stage of the procedure earlier in this paper, to a third stage to obtain absolute-absolute-absolute intrinsic-intrinsic-intrinsic spacetime; absolute-absolute-absolute intrinsic-intrinsic-intrinsic rest mass (or absolute-absolute-absolute nononospace-nononotime; absolute-absolute-absolute nononomass) $(\phi\phi\phi\hat{\hat{\hat{\rho}}}, \phi\phi\phi\hat{\hat{\hat{c}}}\phi\phi\phi\hat{\hat{\hat{t}}}; \phi\phi\phi\hat{\hat{\hat{m}}}_0)$ at the third stage, and probably there is no end to the chain?

In order to provide an answer to this question, let us consider non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ established in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{M}}_0$ of a gravitational field source in $\phi\phi\hat{\hat{\rho}}$ and absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{\hat{V}}_d$ possessed by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ of a particle in

$\phi\phi\hat{\hat{\rho}}$. The $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ will be made manifest in the absolute-absolute intrinsic speeds $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ respectively in $\phi\hat{\rho}$ overlying $\phi\phi\hat{\hat{\rho}}$ and they will be made manifest in absolute-absolute speeds $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in absolute space $\hat{\Sigma}$ overlying $\phi\hat{\rho}$ in the diagram at the left-hand side of Fig. 13(b), as illustrated in Fig. 14(a). The $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ will be
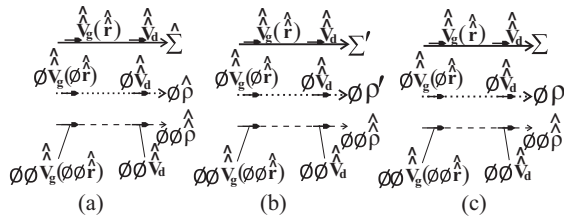

Fig. 14:

made manifest in $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ respectively in the proper intrinsic space $\phi\rho'$ overlying $\phi\phi\hat{\hat{\rho}}$ and they will be made manifest in $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in the proper Euclidean 3-space Σ' overlying $\phi\rho'$ in the diagram at the left-hand side of Fig. 13(c), as illustrated in Fig. 14(b).

Finally $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ will be made manifest in $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ respectively in the relativistic intrinsic space $\phi\rho$ overlying $\phi\phi\hat{\hat{\rho}}$ and they will be made manifest in $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in relativistic Euclidean 3-space Σ overlying $\phi\rho$ in the diagram at the right-hand side of Fig. 13(c), as illustrated in Fig. 14(c).

It can also be said alternatively that the absolute-absolute intrinsic-intrinsic speeds $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ project absolute-absolute intrinsic speeds $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ into the absolute intrinsic space $\phi\hat{\rho}$ and absolute-absolute speeds $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ into absolute space $\hat{\Sigma}$ in Fig. 14(a); $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ project $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ into the proper intrinsic space $\phi\rho'$ and $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ into the proper Euclidean 3-space Σ' in Fig. 14(b) and $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in $\phi\phi\hat{\hat{\rho}}$ project $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ into the relativistic intrinsic space $\phi\rho$ and $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ into the relativistic Euclidean 3-space Σ in Fig. 14(c).

It follows from the foregoing paragraph that $\phi\phi\hat{\hat{V}}_g(\phi\phi\hat{\hat{r}})$ and $\phi\phi\hat{\hat{V}}_d$ in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ are equivalent to $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in absolute space $\hat{\Sigma}$ with respect to '3-observers' $\hat{\Sigma}$ at State 2 of a universe; are equivalent to $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in the proper Euclidean 3-space Σ' with respect to 3-observers in Σ' at State 3 of a universe and are equivalent to $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ respectively in the relativistic Euclidean 3-space Σ with respect to 3-observers in Σ at State 4 of a universe.

Now any magnitude of absolute-absolute intrinsic speeds $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ projected into the absolute intrinsic space $\phi\hat{\rho}$ are equivalent to zero magnitudes of absolute intrinsic speeds $\phi\hat{V}_g(\phi\hat{r})$ and $\phi\hat{V}_d$ respectively in $\phi\hat{\rho}$ and any magnitudes of absolute-absolute speeds $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ projected into the absolute space $\hat{\Sigma}$ are equivalent to zero magnitudes of absolute speeds $\hat{V}_g(\hat{r})$ and $\hat{V}_d$ respectively in $\hat{\Sigma}$ (or with respect to '3-observer' in $\hat{\Sigma}$) in Fig. 14(a).

Any magnitudes of $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ projected into the proper intrinsic space $\phi\rho'$ are equivalent to zero magnitudes of absolute intrinsic speeds $\phi\hat{V}_g(\phi\hat{r})$ and $\phi\hat{V}_d$ respectively in $\phi\rho'$ and any magnitudes of absolute-absolute speeds $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ projected into the proper Euclidean 3-space Σ' are equivalent to zero magnitudes of absolute speeds $\hat{V}_g(\hat{r})$ and $\hat{V}_d$ respectively in Σ' (or with respect to 3-observer in Σ') in Fig. 14(b).

Likewise any magnitudes of $\phi\hat{\hat{V}}_g(\phi\hat{\hat{r}})$ and $\phi\hat{\hat{V}}_d$ projected into the relativistic intrinsic space $\phi\rho$ are equivalent to zero magnitudes of absolute intrinsic speeds $\phi\hat{V}_g(\phi\hat{r})$ and $\phi\hat{V}_d$ respectively in $\phi\rho$ and any magnitudes of absolute-absolute speeds $\hat{\hat{V}}_g(\hat{\hat{r}})$ and $\hat{\hat{V}}_d$ projected into the relativistic Euclidean 3-space Σ are equivalent to zero magnitudes of absolute speeds $\hat{V}_g(\hat{r})$ and $\hat{V}_d$ respectively in Σ (or with respect to 3-observer in Σ) in Fig. 14(c).

As follows from the foregoing three paragraphs, the absolute-absolute intrinsic-intrinsic spacetime (or absolute-absolute nonspace-nonotime) $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ is a frame (an absolute-absolute intrinsic-intrinsic frame) that supports absolute rest (dynamically and gravitationally) on flat spacetimes, that is, on flat absolute spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$, on flat proper spacetime (Σ', ct') and on flat relativistic spacetime (Σ, ct). This means that $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ supports the non-detectable state of zero absolute dynamical speed $(\hat{V}_d = 0)$ of material particles and objects and non-detectable state of uniform zero absolute gravitational speed $(\hat{V}_g(\hat{r}) = 0)$ due to material gravitational field sources on flat spacetime $(\hat{\Sigma}, \hat{c}\hat{t})$, (Σ', ct') and (Σ, ct) with respect to observers in these spacetimes.

Thus an inalienable role of the absolute-absolute intrinsic-intrinsic spacetime $(\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}})$ containing the absolute-absolute intrinsic-intrinsic rest masses $\phi\phi\hat{\hat{m}}_0$ and $\phi\phi\hat{\hat{M}}_0$ of particles and bodies, which lies at the substratum of spacetime/intrinsic spacetime containing mass/intrinsic mass, at the material State 2, State 3 and State 4 of a universe in Table I and in Figs. 13(a) – 13(c), is that it supports absolute rest dynamically with respect to 3-observers in the Euclidean 3-spaces at the material State 2, State 3 and State 4 of a universe in Table I. This is so because the possession of any magnitude of absolute-absolute intrinsic-intrinsic dynamical speed $\hat{\hat{V}}_d$ in the absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\hat{\rho}}$ by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{m}}_0$ of a particle or object in $\phi\phi\hat{\hat{\rho}}$ is equivalent to

- possession of absolute-absolute dynamical speed $\hat{\hat{V}}_d$ of equal magnitude in the absolute space $\hat{\Sigma}$ by the absolute rest mass $\hat{m}_0$ of the particle or object in $\hat{\Sigma}$, (according to Fig. 14(a)), and this is equivalent to possession of zero absolute dynamical speed $(\hat{V}_d = 0)$ in $\hat{\Sigma}$ by $\hat{m}_0$ with respect to '3-observers' in $\hat{\Sigma}$;

- possession of absolute-absolute dynamical speed $\hat{\hat{V}}_d$ of equal magnitude in the proper Euclidean 3-space Σ' by the rest mass m_0 of the particle or object in Σ', (according to Fig. 14(b)), and this is equivalent to possession of zero absolute dynamical speed $(\hat{V}_d = 0)$ in Σ' by m_0 with respect to 3-observers in Σ'; and

- possession of absolute-absolute dynamical speed $\hat{\hat{V}}_d$ of equal magnitude in the relativistic Euclidean 3-space Σ by the relativistic mass m of the particle or object in Σ, (according to Fig. 14(c)), and this is equivalent to possession of zero ab-

solute dynamical speed ($\hat{V}_d = 0$) in Σ by m with respect to 3-observers in Σ.

The absolute-absolute intrinsic-intrinsic spacetime ($\phi\phi\hat{\hat{\rho}}$, $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$) containing the absolute-absolute intrinsic-intrinsic rest masses $\phi\phi\hat{\hat{m}}_0$ and $\phi\phi\hat{\hat{M}}_0$ of particles and bodies, likewise supports 'absolute rest' gravitationally. That is, it supports the state of uniform zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) due to gravitational field sources in the Euclidean 3-spaces at the material State 2, State 3 and State 4 of a universe in Table I, with respect to 3-observers in the physical Euclidean 3-spaces. This is so because the establishment of non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds of any magnitudes $\phi\phi\hat{V}_g(\phi\phi\hat{r})$ in $\phi\phi\hat{\hat{\rho}}$ by the absolute-absolute intrinsic-intrinsic rest mass $\phi\phi\hat{\hat{M}}_0$ in $\phi\phi\hat{\hat{\rho}}$ of a gravitational field source is equivalent to

- establishment of non-uniform absolute-absolute gravitational speeds $\hat{V}_g(\hat{r})$ in the absolute space $\hat{\Sigma}$ by the absolute rest mass $\hat{M}_0$ in $\hat{\Sigma}$ of the gravitational field source, according to Fig. 14(a), which is equivalent to establishment of uniform zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) in $\hat{\Sigma}$ by $\hat{M}_0$ in $\hat{\Sigma}$ with respect to '3-observer' in $\hat{\Sigma}$;

- establishment of non-uniform absolute-absolute gravitational speeds $\hat{V}_g(\hat{r})$ in the proper Euclidean 3-space Σ' by the rest mass M_0 in Σ' of the gravitational field source, according to Fig. 14(b), which is equivalent to establishment of uniform zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) in Σ' by M_0 with respect to 3-observer in Σ'; and

- establishment of non-uniform absolute-absolute gravitational speeds $\hat{V}_g(\hat{r})$ in the relativistic Euclidean 3-space Σ by the relativistic mass M in Σ of the gravitational field source, according to Fig. 14(c), which is equivalent to establishment of uniform zero absolute gravitational speed ($\hat{V}_g(\hat{r}) = 0$) in Σ by M with respect to 3-observer in Σ.

Since absolute rest (i.e. the state $\hat{V}_d = 0$ dynamically and $\hat{V}_g(\hat{r}) = 0$ gravitationally) supported by absolute-absolute intrinsic-intrinsic spacetime ($\phi\phi\hat{\hat{\rho}}$, $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$) containing the absolute-absolute intrinsic-intrinsic rest masses $\phi\phi\hat{\hat{m}}_0$ and $\phi\phi\hat{\hat{M}}_0$ of particles and bodies, is the lowest state of motion in spacetimes ($\hat{\Sigma}, \hat{c}\hat{t}$), ($\Sigma', ct'$) and ($\Sigma, ct$), there is no state of motion (both dynamical and static (or gravitational)) for absolute-absolute-absolute intrinsic-intrinsic-intrinsic spacetime ($\phi\phi\phi\hat{\hat{\hat{\rho}}}$, $\phi\phi\phi\hat{\hat{\hat{c}}}\phi\phi\phi\hat{\hat{\hat{t}}}$) containing the absolute-absolute-absolute intrinsic-intrinsic-intrinsic rest masses $\phi\phi\phi\hat{\hat{\hat{m}}}_0$ and $\phi\phi\phi\hat{\hat{\hat{M}}}_0$ of particles and bodies to support in spacetime in nature.

Even if we prescribe absolute-absolute-absolute spacetime containing absolute-absolute-absolute rest mass ($\hat{\hat{\hat{\Sigma}}}, \hat{\hat{\hat{c}}}\hat{\hat{\hat{t}}}$, $\hat{\hat{\hat{m}}}_0$) and its underlying ($\phi\phi\phi\hat{\hat{\hat{\rho}}}$, $\phi\phi\phi\hat{\hat{\hat{c}}}\phi\phi\phi\hat{\hat{\hat{t}}}$; $\phi\phi\phi\hat{\hat{\hat{m}}}_0$), which is one level lower than ($\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{\hat{t}}, \hat{\hat{m}}_0$) and its underlying ($\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$; $\phi\phi\hat{\hat{m}}_0$) in hierarchy, the two will be equivalent, that is, ($\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{\hat{t}}$, $\hat{\hat{m}}_0$) and its underlying ($\phi\phi\hat{\hat{\rho}}, \phi\phi\phi\hat{\hat{c}}\phi\phi\phi\hat{\hat{t}}$; $\phi\phi\phi\hat{\hat{\hat{m}}}_0$), will be equivalent to ($\hat{\Sigma}, \hat{c}\hat{t}$, $\hat{m}_0$) and its underlying ($\phi\phi\hat{\rho}, \phi\phi\hat{c}\phi\phi\hat{t}$; $\phi\phi\hat{m}_0$) with respect to 3-observers in spacetime ($\hat{\Sigma}, \hat{c}\hat{t}$), ($\Sigma', ct'$) or ($\Sigma, ct$). This is so because ($\phi\phi\phi\hat{\hat{\rho}}, \phi\phi\phi\hat{\hat{c}}\phi\phi\phi\hat{\hat{t}}$; $\phi\phi\phi\hat{\hat{m}}_0$), and ($\phi\phi\hat{\rho}, \phi\phi\hat{c}\phi\phi\hat{t}$; $\phi\phi\hat{m}_0$) will both support absolute rest in spacetimes.

There is therefore no reason to prescribe ($\hat{\hat{\hat{\Sigma}}}, \hat{\hat{\hat{c}}}\hat{\hat{\hat{t}}}$, $\hat{\hat{\hat{m}}}_0$) and its underlying ($\phi\phi\phi\hat{\hat{\hat{\rho}}}, \phi\phi\phi\hat{\hat{\hat{c}}}\phi\phi\phi\hat{\hat{\hat{t}}}$; $\phi\phi\phi\hat{\hat{\hat{m}}}_0$), in nature and consequently there is no reason to go to the third stage of the intrinsic coordinate projection and intrinsic mass 'projection' procedures used to isolate ($\phi\hat{\rho}, \phi\hat{c}\phi\hat{t}; \phi\hat{m}_0$) and ($\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}; \phi\phi\hat{\hat{m}}_0$) at the first and second stages of the procedure earlier in this section. The procedure terminates naturally at the second stage and consequently the lowest level of the hierarchy of spacetime/intrinsic spacetime and mass/intrinsic mass in a universe is the absolute-absolute spacetime containing absolute-absolute rest mass of particles and bodies ($\hat{\hat{\Sigma}}, \hat{\hat{c}}\hat{\hat{t}}; \hat{\hat{m}}_0, \hat{\hat{\varepsilon}}/\hat{\hat{c}}^2$) and its underlying absolute-absolute intrinsic-intrinsic spacetime containing absolute-absolute intrinsic-intrinsic rest mass ($\phi\phi\hat{\hat{\rho}}, \phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}; \phi\phi\hat{\hat{m}}_0, \phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2$)

There is likewise no spacetime/intrinsic spacetime and associated mass/intrinsic mass that is higher than the relativistic spacetime/intrinsic spacetime (Σ, ct)/($\phi\rho, \phi c\phi t$) containing relativistic mass/relativistic intrinsic mass ($m, \varepsilon/c^2$)/($\phi m, \phi\varepsilon/\phi c^2$) in hierarchy in nature. The evolutionary sequence of spacetime/intrinsic spacetime and associated evolutionary sequence of mass/intrinsic mass in a universe terminate naturally at the third stage, which corresponds to the second stage in every gravitational field, as shall be justified more formally elsewhere with further development.

4 Further on the concepts of co-moving speed/intrinsic co-moving speed and their relationships to gravitational speed/intrinsic gravitational speed and dynamical speed/intrinsic dynamical speed

The zero absolute intrinsic co-moving speed ($\phi\hat{V}_0 = 0$) at every point along the straight line absolute intrinsic space $\phi\hat{\rho}$ along the horizontal (not shown) with respect '3-observers' in the absolute space $\hat{\Sigma}$ in the reference diagram of Fig. 12(a) is retained at every point along the curved $\phi\hat{\rho}$ (also not shown) with respect to 3-observers in the proper Euclidean 3-space Σ' in Figs. 13(b) and 13(c). That is, there is ($\phi\hat{V}_0 = 0$) (not shown) at every point along the curved $\phi\hat{\rho}$ in Figs. 13(b) and 13(c).

The absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ along the vertical (not shown) with respect to '3-observers' in $\hat{\Sigma}$ in Fig. 12(a) is likewise retained along the curved $\phi\hat{c}\phi\hat{t}$ (not shown) with respect to 3-observers in Σ' in Figs. 13(b) and 13(c). That is, there is ($\phi\hat{V}_0 = \phi\hat{c}_0$) (not shown) at every point along the curved $\phi\hat{c}\phi\hat{t}$ in Figs. 13(b) and 13(c).

As known from [8], it is the non-uniform absolute intrinsic gravitational speeds $\phi\hat{V}_g(\phi\hat{r})$ established along $\phi\hat{\rho}$ by $\phi\hat{M}_0$ in $\phi\hat{\rho}$ and non-uniform absolute intrinsic gravitational speeds $\phi\hat{V}_g(\phi\hat{r})$ established along $\phi\hat{c}\phi\hat{t}$ by $\phi\hat{E}/\phi\hat{c}^2$ ($\equiv \phi\hat{M}_0$) in $\phi\hat{c}\phi\hat{t}$ that cause the curvature of $\phi\hat{\rho}$ and $\phi\hat{c}\phi\hat{t}$ in Figs. 13(b) and 13(c). There is non-uniform absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ along the curved $\phi\hat{\rho}$ and curved $\phi\hat{c}\phi\hat{t}$ in addition to constant absolute intrinsic co-moving speed $\phi\hat{V}_0 = 0$ at every point along the curved $\phi\hat{\rho}$ and constant $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the curved $\phi\hat{c}\phi\hat{t}$ in Figs. 13(b) and 13(c).

We recall from our discussion earlier in this paper that any magnitude of absolute intrinsic co-moving speed $\phi\hat{V}_0$ is equivalent to

zero magnitude of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$. It also follows from the foregoing three paragraphs that the absolute intrinsic co-moving speeds $\phi\hat{V}_0 = 0$ at every point along the straight line $\phi\hat{\rho}$ and $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the straight line $\phi\hat{c}\phi\hat{t}$ in the absence of absolute intrinsic gravitational speeds in Fig. 12(a), are not affected by the presence of non-uniform absolute intrinsic gravitational speeds along the curved $\phi\hat{\rho}$ and curved $\phi\hat{c}\phi\hat{t}$ in Figs. 13(b) and 13(c). In other words, the absolute intrinsic co-moving speeds along $\phi\hat{\rho}$ and $\phi\hat{c}\phi\hat{t}$ are unaffected by the presence of absolute intrinsic gravity (ϕAG).

Now the curved $\phi\hat{\rho}$ and the absolute intrinsic rest mass $\phi\hat{M}_0$ of the gravitational field source at its origin are projected as straight line proper intrinsic space $\phi\rho'$ containing 'projective' intrinsic rest mass ϕM_0 of the gravitational field source along the horizontal and the zero absolute intrinsic co-moving speed ($\phi\hat{V}_0 = 0$) (not shown) at every point along the curved $\phi\hat{\rho}$ is projected as zero proper intrinsic co-moving speed ($\phi V_0' = 0$) (also not shown) at every point along the projective proper intrinsic space $\phi\rho'$ along the horizontal with respect to 3-observers in Σ' in the diagram at the left-hand side in Fig. 13(c).

The curved $\phi\hat{c}\phi\hat{t}$ and the absolute intrinsic rest mass $\phi\hat{E}/\phi\hat{c}^2$ of the gravitational field source at its origin are projected as straight line proper intrinsic time dimension $\phi c\phi t'$ containing intrinsic rest mass $\phi E'/\phi c^2$ along the vertical and the absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ (not shown) at every point along the curved $\phi\hat{c}\phi\hat{t}$ is projected as proper intrinsic co-moving speed $\phi V_0' = \phi c_0$ (also not shown) at every point along the projective $\phi c\phi t'$ along the vertical in the diagram at the left-hand side in Fig. 13(c).

The zero proper intrinsic co-moving speed ($\phi V_0' = 0$) (not shown) at every point along the straight line proper intrinsic space $\phi\rho'$ along the horizontal at the first stage of evolution of spacetime/intrinsic spacetime in a gravitational field in the diagram at the left-hand side in Fig. 13(c) is retained at every point along the curved $\phi\rho'$ (not shown) in the diagram at the right-hand side in Fig. 13(c) at the second stage of evolution of spacetime/intrinsic spacetime in a gravitational field. Likewise the proper intrinsic co-moving speed $\phi V_0' = \phi c_0$ (not shown) at every point along the straight line proper intrinsic time dimension $\phi c\phi t'$ along the vertical in the diagram at the left-hand side in Fig. 13(c) is retained at every point along the curved $\phi c\phi t'$ (not shown) in the diagram at the right-hand side in Fig. 13(c).

Apart from the zero proper intrinsic co-moving speed ($\phi V_0' = 0$) (not shown) at every point along the curved proper intrinsic space $\phi\rho'$, there are non-uniform proper intrinsic gravitational speeds $\phi V_g'(\phi r')$ established along the curved $\phi\rho'$ by ϕM_0 at the origin of the curved $\phi\rho'$ and apart from the proper intrinsic co-moving speed $\phi V_0' = \phi c_0$ (not shown) at every point along the curved proper intrinsic time dimension $\phi c\phi t'$, there are non-uniform proper intrinsic gravitational speeds $\phi V_g(\phi r')$ established along the curved $\phi c\phi t'$ by $\phi E'/\phi c^2$ in $\phi c\phi t'$ in the diagram at the right-hand side in Fig. 13(c). Again any magnitude of the proper intrinsic co-moving speed $\phi V_0'$ is equivalent to zero magnitude of proper intrinsic gravitational speed $\phi V_g(\phi r')$ along the curved proper intrinsic dimensions $\phi\rho'$ and $\phi c\phi t'$.

The curved proper intrinsic space $\phi\rho'$ containing the intrinsic rest mass ϕM_0 of the gravitational field source at its origin, projects straight line relativistic intrinsic space $\phi\rho$ containing the relativistic intrinsic mass ϕM of the gravitational field source along the hori-

zontal and the zero proper intrinsic co-moving speed $\phi V_0' = 0$ (not shown) at every point along the curved $\phi\rho'$ is projected as zero relativistic intrinsic co-moving speed ($\phi V_0 = 0$) (also not shown) at every point along the straight line $\phi\rho$ along the horizontal in the diagram at the right-hand side in Fig. 13(c).

The curved proper intrinsic time dimension $\phi c\phi t'$ containing the intrinsic rest mass $\phi E'/\phi c^2$ ($\equiv \phi M_0$) of the gravitational field source at its origin, likewise projects straight line relativistic intrinsic time dimension $\phi c\phi t$ containing the relativistic intrinsic mass $\phi E/\phi c^2$ ($\equiv \phi M$) of the gravitational field source along the vertical and the proper intrinsic co-moving speed $\phi V_0' = \phi c_0$ (not shown) at every point along the curved $\phi c\phi t'$ is projected as relativistic intrinsic co-moving speed $\phi V_0 = \phi c_0$ (also not shown) at every point along the straight line relativistic intrinsic time dimension $\phi c\phi t$ along the vertical in the diagram at the right-hand side in Fig. 13(c).

The projective straight line relativistic intrinsic space $\phi\rho$ containing relativistic intrinsic mass ϕM along the horizontal is then made manifest outwardly in the relativistic Euclidean 3-space Σ containing the relativistic mass M of the gravitational field source and the projective zero relativistic intrinsic co-moving speed ($\phi V_0 = 0$) (not shown) at every point along $\phi\rho$ is made manifest in zero relativistic co-moving speed ($V_0 = 0$) (also not shown) at every point in the relativistic Euclidean 3-space Σ, with respect to 3-observers in Σ in Fig. 13(c).

The projective straight line relativistic intrinsic time dimension $\phi c\phi t$ containing relativistic intrinsic mass $\phi E/\phi c^2$ ($\equiv \phi M$) of the gravitational field source along the vertical is likewise made manifest outwardly in the relativistic time dimension ct containing relativistic mass E/c^2 ($\equiv M$) of the gravitational field source and the projective relativistic intrinsic co-moving speed $\phi V_0 = \phi c_0$ (not shown) at every point along $\phi c\phi t$ is made manifest in relativistic co-moving speed $V_0 = c_0$ (also not shown) at every point along the relativistic time dimension ct with respect to 3-observers in Σ in Fig. 13(c).

The following points that follow from the foregoing discussion based on Figs. 13(a) – 13(c) are worthy of remark about the final diagram of Fig. 13(c):

1. There is constant zero absolute-absolute intrinsic-intrinsic co-moving speed ($\phi\phi\hat{V}_0 = 0$) (not shown) at every point along the straight line absolute-absolute intrinsic-intrinsic space $\phi\phi\hat{\rho}$ along the horizontal and constant absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{V}_0 = \phi\phi\hat{c}_0$ (also not shown) at every point along the straight line absolute-absolute intrinsic-intrinsic time 'dimension' $\phi\phi\hat{c}\phi\phi\hat{t}$ along the vertical in Figs. 13(c). There are, in addition, non-uniform absolute-absolute intrinsic-intrinsic gravitational speeds $\phi\phi\hat{V}_g(\phi\phi\hat{r})$ established along $\phi\phi\hat{\rho}$ by $\phi\phi\hat{M}_0$ in $\phi\phi\hat{\rho}$ and along $\phi\phi\hat{c}\phi\phi\hat{t}$ established by $\phi\phi\hat{E}/\phi\phi\hat{c}^2$ in $\phi\phi\hat{c}\phi\phi\hat{t}$.

   However any magnitude of absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{V}_0$ is equivalent to zero magnitude of absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{V}_g(\phi\phi\hat{r})$ and any magnitude of $\phi\phi\hat{V}_0$ is equivalent to zero magnitude of absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{V}_d$. Moreover the absolute-absolute intrinsic-intrinsic gravitational speed $\phi\phi\hat{V}_g(\phi\phi\hat{r})$ is not made mani-

fest in absolute-absolute intrinsic-intrinsic motion (or absolute-absolute intrinsic-intrinsic translation), as would absolute-absolute intrinsic-intrinsic dynamical speed $\phi\phi\hat{V}_d$. Consequently every point along the absolute-absolute intrinsic-intrinsic time 'dimension' $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ along the vertical remains stationary relative to its absolutely stationary symmetry-partner point along $\phi\phi\hat{\hat{\rho}}$ along the horizontal at all times, despite $\phi\phi\hat{V}_0 = \phi\phi\hat{\hat{c}}_0$ at every point along $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ and despite non-uniform $\phi\phi\hat{V}_g(\phi\phi\hat{r})$ along $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ in Fig. 13(c).

There is constant zero absolute intrinsic co-moving speed $(\phi\hat{V}_0 = 0)$ at every point along the curved absolute intrinsic space $\phi\hat{\rho}$ and constant absolute intrinsic co-moving speed $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the curved absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ with respect to 3-observers in Σ in Fig. 13(c). There are in addition, non-uniform absolute intrinsic gravitational speeds $\phi\hat{V}_g(\phi\hat{r})$ established along the curved $\phi\hat{\rho}$ by $\phi\hat{M}_0$ in $\phi\hat{\rho}$ with respect to 3-observers in Σ and non-uniform $\phi\hat{V}_g(\phi\hat{r})$ established along the curved $\phi\hat{c}\phi\hat{t}$ by $\phi\hat{E}_0/\phi\hat{c}^2$ in $\phi\hat{c}\phi\hat{t}$ with respect to 1-observers in ct in Fig. 13(c).

However any magnitude of absolute intrinsic co-moving speed $\phi\hat{V}_0$ is equivalent to zero magnitude of absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ and any magnitude of $\phi\hat{V}_0$ is equivalent to zero magnitude of absolute intrinsic dynamical speed $\phi\hat{V}_d$. Moreover the absolute intrinsic gravitational speed $\phi\hat{V}_g(\phi\hat{r})$ is not made manifest in absolute intrinsic motion (or absolute intrinsic translation) as would absolute intrinsic kinematical speed $\phi\hat{V}_d$. Consequently every point along the curved absolute intrinsic time 'dimension' $\phi\hat{c}\phi\hat{t}$ remains stationary relative to its absolutely stationary symmetry-partner point along the curved $\phi\hat{\rho}$ at all times, despite $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along $\phi\hat{c}\phi\hat{t}$ and non-uniform $\phi\hat{V}_g(\phi\hat{r})$ along $\phi\hat{c}\phi\hat{t}$ in Fig. 13(c).

There is constant zero proper intrinsic co-moving speed $(\phi V_0' = 0)$ at every point along the curved proper intrinsic space $\phi\rho'$ and constant intrinsic co-moving speed $\phi V_0 = \phi c_0$ at every point along the curved proper intrinsic time dimension $\phi c\phi t'$ with respect to 3-observers in Σ in Fig. 13(c). There are in addition, non-uniform proper intrinsic gravitational speeds $\phi V_g'(\phi r')$ established along the curved $\phi\rho'$ by ϕM_0 in $\phi\rho'$ with respect to 3-observers in Σ and non-uniform proper intrinsic gravitational speed $\phi V_g'(\phi r')$ established along the curved $\phi c\phi t'$ by $\phi M_0\phi c^2$ in $\phi c\phi t'$ with respect to 1-observers in ct in Fig. 13(c).

However any magnitude of proper intrinsic co-moving speed $\phi V_0'$ is equivalent to zero magnitude of proper intrinsic gravitational speed $\phi V_g'(\phi r')$ and any magnitude of $\phi V_0'$ is equivalent to zero magnitude of a relative intrinsic dynamical speed ϕv. Moreover the proper intrinsic gravitational speed $\phi V_g'(\phi r')$ is not made manifest in intrinsic motion (or intrinsic translation) as would a relative intrinsic dynamical speed ϕv. Consequently every point along the curved proper intrinsic time dimension $\phi c\phi t'$ remains stationary relative to its absolutely stationary symmetry-partner point along the curved $\phi\rho'$ at all times, despite $\phi V_0' = \phi c_0$ at every point along the curved $\phi c\phi t'$ and non-uniform $\phi V_g'(\phi r')$ along the curved

$\phi c\phi t'$ in Fig. 13(c).

There is constant zero relativistic intrinsic co-moving speed $(\phi V_0 = 0)$ at every point along the straight line relativistic intrinsic space $\phi\rho$ along the horizontal and constant intrinsic co-moving speed $\phi V_0 = \phi c_0$ at every point along the straight line relativistic intrinsic time dimension $\phi c\phi t$ along the vertical with respect to 3-observers in Σ in Fig. 13(c). There are, in addition, non-uniform proper intrinsic gravitational speeds $\phi V_g'(\phi r')$ invariantly projected along the straight line $\phi\rho$ along the horizontal by $\phi V_g'(\phi r')$ along the curved $\phi\rho'$ with respect to 3-observers in Σ and non-uniform $\phi V_g'(\phi r')$ invariantly projected along $\phi c\phi t$ along the vertical by $\phi V_g'(\phi r')$ along the curved $\phi c\phi t'$ with respect to 1-observers in ct in Fig. 13(c).

However any magnitude of intrinsic co-moving speed ϕV_0 is equivalent to zero magnitude of proper intrinsic gravitational speed $\phi V_g'(\phi r')$ and any magnitude of ϕV_0 is equivalent to zero magnitude of a relative intrinsic dynamical speed ϕv. Moreover the proper intrinsic gravitational speed $\phi V_g'(\phi r')$ is not made manifest in intrinsic motion (or intrinsic translation) as would a relative intrinsic dynamical speed ϕv. Consequently every point along the straight line relativistic intrinsic time dimension $\phi c\phi t$ along the vertical remains stationary relative to its absolutely stationary symmetry-partner point along the straight line relativistic intrinsic space $\phi\rho$ along the horizontal at all times, despite $\phi V_0 = \phi c_0$ at every point along $\phi c\phi t$ and despite non-uniform $\phi V_g'(\phi r')$ along $\phi c\phi t$ in Fig. 13(c).

Finally there is constant zero co-moving relativistic speed $(V_0 = 0)$ at every point in the relativistic Euclidean 3-space Σ and constant relativistic co-moving speed $V_0 = c_0$ at every point along the straight line relativistic time dimension ct along the vertical with respect to 3-observers in Σ in Fig. 13(c). There are, in addition, non-uniform proper gravitational velocities $\vec{V}_g'(r')$ along every radial direction from the centre of the relativistic mass M of the gravitational field source in Σ with respect to 3-observers in Σ and non-uniform proper gravitational speeds $V_g'(r')$ along the straight line relativistic time dimension ct along the vertical with respect to 1-observers in ct in Fig. 13(c).

However any magnitude of co-moving speed V_0 is equivalent to zero magnitude of proper gravitational speed $V_g'(r')$ and any magnitude of V_0 is equivalent to zero magnitude of a relative kinematical speed v. Moreover the proper gravitational speed $V_g'(r')$ is not made manifest in motion (or translation) as would a relative dynamical speed. Consequently every point along the straight line relativistic time dimension ct along the vertical remains stationary relative to its absolutely stationary symmetry-partner point in the relativistic Euclidean 3-space Σ at all times, despite $V_0 = c_0$ at every point along ct and non-uniform $V_g(r')$ along ct in Fig. 13(c).

2. As deduced earlier in this paper, it is the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{c}}_0$ at every point along the absolute-absolute intrinsic-intrinsic time 'dimension' that must appear in the notation of that 'dimension' as $\phi\phi\hat{\hat{c}}_0\phi\phi\hat{\hat{t}}$; it is the absolute intrinsic co-moving speed $\phi\hat{c}_0$ at every point along the straight line or curved absolute intrinsic time 'di-

mension' that must appear in the notation of that 'dimension' as $\phi\hat{c}_0\phi\hat{t}$; it is the intrinsic co-moving speed ϕc_0 at every point along the straight line or curved proper intrinsic time dimension and along the straight line relativistic intrinsic time dimension that must appear in the notations of those intrinsic dimensions as $\phi c_0\phi t'$ and $\phi c_0\phi t$ and it is the co-moving speed c_0 at every point along the straight line proper time dimension and straight line relativistic time dimension that must appear in the notations of those dimensions as $c_0 t'$ and $c_0 t$ in Fig. 13(c). Having taken proper note of these facts however, the notations $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$, $\phi\hat{c}\phi\hat{t}$, $\phi c\phi t'$, ct' and ct shall be adopted, as done in Figs. 13(a) – 13(c) and in Table I. This is done for aesthetics and in order to be consistent with the age-long universal notations of the proper and relativistic time dimensions as ct' (or $c\tau$) and ct respectively in physics, as mentioned earlier.

3. As also deduced earlier in this paper, it is the absolute-absolute intrinsic-intrinsic co-moving speed $\phi\phi\hat{\hat{c}}_0$ at every point along $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ that must appear in the notation of the equivalent absolute-absolute intrinsic-intrinsic rest mass of particles and objects in $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$ as $\phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}_0{}^2$ ($\equiv \phi\phi\hat{\hat{m}}_0$) and $\phi\phi\hat{\hat{E}}/\phi\phi\hat{\hat{c}}_0{}^2$ ($\equiv \phi\phi\hat{\hat{M}}_0$); it is the absolute intrinsic co-moving speed $\phi\hat{c}_0$ at every point along $\phi\hat{c}\phi\hat{t}$ that must appear in the notation of the equivalent absolute intrinsic rest mass of particles and bodies in $\phi\hat{c}\phi\hat{t}$ as $\phi\hat{\varepsilon}/\phi\hat{c}_0^2$ ($\equiv \phi\hat{m}_0$) and $\phi\hat{E}/\phi\hat{c}_0^2$ ($\equiv \phi\hat{M}_0$); it is the intrinsic co-moving speed ϕc_0 at every point along the proper intrinsic time dimension $\phi c\phi t'$ and relativistic intrinsic time dimension $\phi c\phi t$ that must appear in the notation of the equivalent intrinsic rest mass of particles and bodies as $\phi\varepsilon'/\phi c_0^2$ ($\equiv \phi m_0$) and $\phi E'/\phi c_0^2$ ($\equiv \phi M_0$) in $\phi c\phi t'$ and in the notation of the equivalent relativistic intrinsic mass (or intrinsic inertial mass) of particles and bodies as $\phi\varepsilon/\phi c_0^2$ ($\equiv \phi m$) and $\phi E/\phi c_0^2$ ($\equiv \phi M$) in $\phi c\phi t$ and it is the co-moving speed c_0 at every point along the proper time dimension ct' and relativistic time dimension ct that must appear in the notation of the equivalent rest mass of particles and bodies as ε'/c_0^2 ($\equiv m_0$) and E'/c_0^2 ($\equiv M_0$) in ct' and in the notation of the equivalent relativistic mass of particles and bodies as ε/c_0^2 ($\equiv m$) and E/c_0^2 ($\equiv M$) in ct.

The fact that the co-moving speed c_0 is equivalent to zero gravitational speed and is equivalent to zero dynamical speed, makes ε'/c_0^2 ($\equiv m_0$) and E'/c_0^2 ($\equiv M_0$) in ct' to be purely material with gravitational and inertial attributes exactly like m_0 and M_0 in Σ'. Likewise ε/c_0^2 and E/c_0^2 in ct are purely material with gravitational and inertial attributes exactly like m and M in Σ. Consequently ε'/c_0^2 and E'/c_0^2 in ct' will participate in theories of gravity and motion exactly like m_0 and M_0 in Σ' and ε/c_0^2 and E/c_0^2 in ct will participate in theories of gravity and motion exactly like m and M in Σ. Should the co-moving speed $c_0 = 3\times 10^3$ m/s be replaced by gravitational speed $c_g = 3\times 10^3$ m/s (of gravitational waves) or dynamical speed $c_d = 3\times 10^8$ m/s (of electromagnetic waves), to have ε'/c_g^2, E'/c_g^2 or ε'/c_d^2, E'/c_d^2 in ct' and ε/c_g^2, E/c_g^2 or ε/c_d^2, E/c_d^2 in ct, then ε'/c_g^2, E'/c_g^2 in ct' and ε/c_g^2, E/c_g^2 in ct will be purely immaterial with zero gravitational and zero inertial attributes like graviton and cannot participate in theories of gravity and motion in space-

time. Likewise ε'/c_d^2, E/c_d^2 in ct' and ε/c_d^2, E/c_d^2 ct will be purely immaterial with zero gravitational and zero inertial attributes like photon and cannot participate in theories of gravity and motion in spacetime.

Having properly taken note of the fact that $\phi\phi\hat{\hat{E}}/\phi\phi\hat{\hat{c}}_0{}^2$, $\phi\hat{E}/\phi\hat{c}_0^2$, $\phi E'/\phi c_0^2$, $\phi E/\phi c_0^2$, E'/c_0^2 and E/c_0^2 are the correct notations for these hierarchy of intrinsic masses in hierarchy of intrinsic time dimensions and hierarchy of masses in hierarchy of time dimensions, we shall, for convenience and aesthetics, adopt the notations $\phi\phi\hat{\hat{E}}/\phi\phi\hat{\hat{c}}^2$, $\phi\hat{E}/\phi\hat{c}^2$, $\phi E'/\phi c^2$, $\phi E/\phi c^2$, E'/c^2 and E/c^2, as done already in Figs. 13(a) – 13(c) and in Table I. It shall be reiterated that $\phi\phi\hat{\hat{c}} \equiv \phi\phi\hat{\hat{c}}_0$; $\phi\hat{c} \equiv \phi\hat{c}_0$; $\phi c \equiv \phi c_0$ and $c \equiv c_0$ in these adopted notations.

4. The constant $\phi\phi\hat{\hat{V}}_0 = 0$ at every point along the straight line $\phi\phi\hat{\hat{\rho}}$; the constant $\phi\hat{V}_0 = 0$ at every point along the curved $\phi\hat{\rho}$; the constant $\phi V_0' = 0$ at every point along the curved $\phi\rho'$; the constant $\phi V_0 = 0$ at every point along the straight line $\phi\rho$ and the constant $V_0 = 0$ at every point in Σ in the diagram at the right-hand side in Fig. 13(c) remain unchanged within different gravitational fields.

Likewise the constant $\phi\phi\hat{\hat{V}}_0 = \phi\phi\hat{\hat{c}}_0$ at every point along the straight line $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$; the constant $\phi\hat{V}_0 = \phi\hat{c}_0$ at every point along the curved $\phi\hat{c}\phi\hat{t}$; the constant $\phi V_0' = \phi c_0$ at every point along the curved $\phi c\phi t'$; the constant $\phi V_0 = \phi c_0$ at every point along the straight line $\phi c\phi t$ and the constant $V_0 = c_0$ at every along the straight line ct in the diagram at the right-hand side in Fig. 13(c) remain unchanged within different gravitational fields.

The implications of the foregoing two paragraphs include the following

(a) The notations $\phi\phi\hat{\hat{c}}\phi\phi\hat{\hat{t}}$, $\phi\hat{c}\phi\hat{t}$, $\phi c\phi t'$, ct' and ct for the hierarchy of intrinsic time dimensions and hierarchy of time dimensions are valid in all gravitational fields, (which is so since $\phi\phi\hat{\hat{c}} \equiv \phi\phi\hat{\hat{c}}_0$; $\phi\hat{c} \equiv \phi\hat{c}_0$; $\phi c \equiv \phi c_0$ and $c \equiv c_0$ in these intrinsic dimensions and dimensions remain unchanged in gravitational fields of different strengths);

(b) The notations $\phi\phi\hat{\hat{\varepsilon}}/\phi\phi\hat{\hat{c}}^2$, $\phi\hat{\varepsilon}/\phi\hat{c}^2$, $\phi\varepsilon'/\phi c^2$, $\phi\varepsilon/\phi c^2$, ε'/c^2 and ε/c^2 for hierarchy of equivalent intrinsic masses of a particle or object in the hierarchy of intrinsic time dimensions and hierarchy of equivalent masses of the particle or object in the hierarchy of time dimensions remain unchanged at different positions along the respective intrinsic time dimensions and respective time dimensions within a gravitational field. They also remain unchanged at different positions within gravitational fields of different strengths.

(c) The presence of hierarchy of intrinsic gravitational fields does not affect the hierarchy of intrinsic co-moving speeds in the hierarchy of intrinsic spacetimes and the presence of hierarchy of gravitational fields does not affect the hierarchy of co-moving speeds in the hierarchy of spacetimes. Conversely, the hierarchy of intrinsic co-moving speeds in the hierarchy of intrinsic spacetimes and hierarchy of co-moving speeds in the

hierarchy of spacetimes, contribute nothing to the hierarchy of theories of gravity/intrinsic gravity formulated on the hierarchy of intrinsic spacetimes and hierarchy of spacetimes. They likewise contribute nothing to the hierarchy of theories of motion/intrinsic motion formulated on the hierarchy of intrinsic spacetimes and hierarchy of spacetimes.

Although the origins and exact natures of the hierarchies of co-moving speeds and intrinsic co-moving speeds are yet unknown, it is clear from the discussions in this sub-section that these concepts cannot be relegated in the present theory. However, we shall, by virtue of item 4(c) above, remain silent over these concepts, except for inevitable passing references to them, while formulating the hierarchies of theories of gravity and intrinsic gravity and hierarchies of theories of combined gravity and motion and combined intrinsic gravity and intrinsic motion, upon the new spacetime/intrinsic spacetime geometries of Figs. 13(b) and 13(c) at the first and second stages of evolutions of spacetime/intrinsic spacetime and mass/intrinsic mass in a gravitational field. The concepts of co-moving speed/intrinsic co-moving speed and the phenomena/intrinsic phenomena associated with them shall be isolated formally ultimately and incorporated into the present theory with further development.

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