Movement principles of the fast-spinning bodies

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Abstract. *In this article are the 5 tables for calculating the average translational velocities of all milisecond pulsars and others fast spinning bodies and shift the center of gravity due to the rotation. Corrections theory ideal spining circle for real bodies. Extreme values for neutron stars. Summary values for neutron stars. A new perspective on neutronization and nuclear fusion. Consent theory with the real Universe.*

Keywords: stars: kinematics, pulsars: general, stellar dynamics, , stars: neutron,

PACS number: *97.60.Gb, 97.60.Jd,*

1.Introduction

The origin of millisecond pulsars is still unknown. The leading theory is that they begin life as longer period pulsars but are spun up or "recycled" through accretion. For this reason, millisecond pulsars are sometimes called recycled pulsars. The standard evolutionary model fails to explain the evolution of all millisecond pulsars, especially young millisecond pulsars with relatively high magnetic fields . Different millisecond pulsars must form by at least two distinct processes.[30]But the nature of the other process remains a mystery.[31] The proposed views are in the end of this manuscript.

In article:

Hobbs G., Lorimer D.R., Lyne A.G., Kramer M. : A statistical study of 233 pulsar proper motions**,** *MNRAS July 1, 2005 vol. 360 no. 3 974-992*

they write [9]:

„Neutron stars are high-velocity objects....Many of the one-dimensional (1D) and two-dimensional (2D) speeds (referring to speeds measured in one coordinate only and the magnitudes of the transverse velocities, respectively) derived from these measurements are somewhat lower than earlier estimates because of the use of the most recent electron density model in determining pulsar distances. The mean 1D speeds for the normal and recycled pulsars are 152(10) and 54(6) km s^{-1}, respectively. The corresponding mean 2D speeds are 246(22) and 87(13) km s^{-1}. PSRs B2011+38 and B2224+64 have the highest inferred 2D speeds of ~1600 km s^{-1}. We study the mean speeds for different subsamples and find that, in general, they agree with previous results. Applying a novel deconvolution technique to the sample of 73 pulsars with characteristic ages less than 3 Myr, we find the mean three-dimensional (3D) pulsar birth velocity to be 400(40) km s^{-1}. The distribution of velocities is well described by a Maxwellian distribution with 1D rms σ = 265 km s^{-1}. There is no evidence for a bimodal velocity distribution. The proper motions for PSRs B1830-08 and B2334+61 are consistent with their proposed associations with the supernova remnants W41 and G114.3+0.3, respectively.

Using the Taylor & Cordes (1993; hereafter TC93) model, Lyne & Lorimer (1994) found the mean pulsar birth velocity[2] to be 450(90) km s^{-1}. Recently, Cordes & Lazio (2002; hereafter CL02) provided an updated model which, on average, predicts somewhat smaller distances than TC93 which will clearly have an impact on the calculated velocities. Hereafter, we designate the velocities derived from the two models as V^{TC} and V^{CL}

1. The fastest moving pulsar with a well-defined distance is PSR B1133+16 which has a 2D speed of 640 km s^{-1}. However, according to the CL02 (and TC03) distance model PSRs B2011+38 and B2224+65 both have 2D speeds greater than 1500 km s^{-1}.
2. (iv) The CL02 distance model generally predicts smaller distances, and hence 2D speeds, than the TC03 model. The mean 1D and 2D speeds for pulsars with characteristic ages less than 3 Myr are 192(20) and 307(47) km s^{-1}. The observed 1D and 2D speeds clearly demonstrate that the 3D velocity vector is isotropic.
3. (v) Based on a deconvolution analysis of the new samples of 1D and 2D speeds of young pulsars, we find the mean 3D birth speed to be 400(40) km s^{-1}. The 3D speeds are well fit by a Maxwellian distribution with 1D rms σ = 265 km s^{-1}. We find no evidence for a bimodal velocity distribution.

The implications of these results for 'kick' mechanisms may be summarized by stating that the true space velocities of young pulsars range from a few tens to well over 1000 km s^{-1} with a mean velocity of 400(40) km s^{-1}. According to Lai et al. (2001): (1) local convective instabilities in the collapsed stellar core can account for velocities up to ~100 km s^{-1}; (2) global asymmetric perturbations can create velocities over 1000 km s^{-1}; (3) asymmetric neutrino emission can provide kick velocities up to ~1000 km s^{-1}; (4) the electromagnetic rocket effect can accelerate pulsars up to similarly high velocities[9]."

In this manuscript the theoretical values calculated average speeds millisecond pulsar according to a new theory[1]

2. Theory

$$E_{mov} = E_{still}\left(1-\frac{v}{c}\cos\vartheta\right)^2 \tag{2.20}$$

where ϑ is the angle between the direction of the charge motion (the speed v) and the direction of propagation of intensity[1].

3.Possible generalization of the theory for gravitational field, where the speed of propagation is finite and equals *c*.

For the sake of simplicity let us consider for instance the gravitational field of the Earth. Analogically to (2.20), for the intensity of the gravitational field one could write:

$$g_{mov} = g_{still}\left(1-\frac{v}{c}\cos\vartheta\right)^2 \tag{3.1}$$

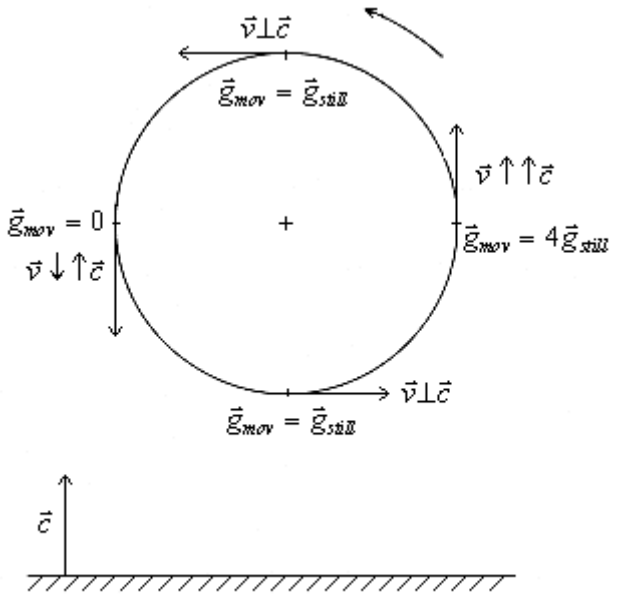

Fig. 3.1. The body is rotating at vertical level

Should we want to withdraw from the gravitational field of the Earth, it will be necessary to aim at $g_{\text{mov}} \to 0$.

Then the weight of bodies will be falling down $G = m g_{\text{mov}} \to 0$.

However, the mass of bodies remains unchanged. Individual material particles of the body will move in a prevailing measure in direction to the Earth at the highest possible speed (in ideal case $v \cos\vartheta \to (-c)$), but the center of gravity should at the same time move away from the Earth. This is possible only with the special rotation of body around the axis passing trough the center of gravity, while the body rotates at vertical level (see fig.3.1).

c - the speed and direction of propagation of the gravitational waves of the Earth. The points moving at speed of *c* towards the Earth ($v \cos\vartheta = -c$) are of no weight. The points moving at the speed of c away from the Earth weight 4x more than is standstill (see fig.3.2).

In consequence of rotation, the center of gravity will be shifted to the part departing from the Earth. This means that the body should depart from the Earth as a consequence of rotation (since the shifted center of gravity is situated in the half emerging during the rotation, i. e. departing from the Earth).

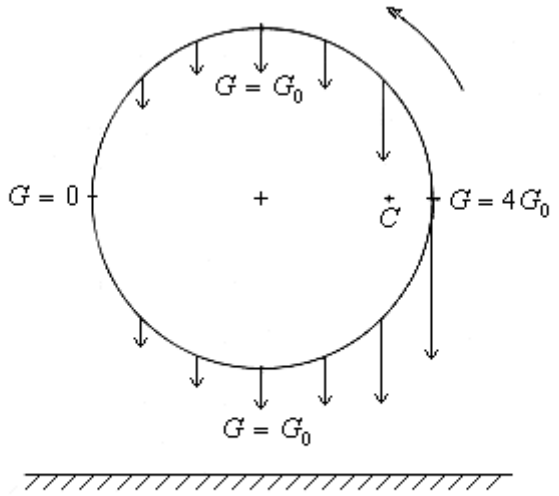

Fig. 3.2. The point moving at speed c away from the Earth
weight 4x more then standstill

For the sake of simplicity, let us consider the rotating body whose mass is evenly distributed on the circle with radius *r*.

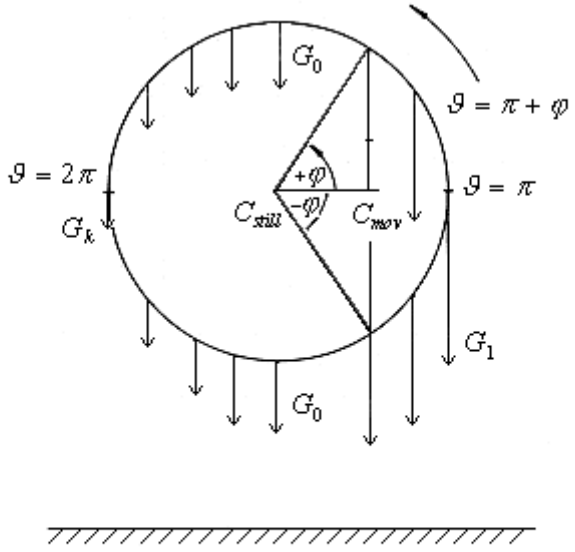

Fig. 3.3. Once it starts rotating at the circumference speed v the center of gravity will be shifted in the distance r_c

In case such a body does not rotate, its center of gravity is in the center. Once it starts rotating at the circumference speed of v, the center of gravity will be shifted in the distance of r_c, which will be calculated as in fig.3.3. Each point of weight G_0 will, in result of rotation, weight

$$G_i = G_0\left(1 - \frac{v}{c}\cos\vartheta\right)^2$$

There is a certain angle φ for which

$$\cos\varphi = \frac{r_c}{r} \tag{3.2}$$

The weight of points to the right from C_{mov} must be equal to the weight of points to the left from C_{mov} which will be written as follows:

$$\int_{\pi-\varphi}^{\pi} G_0\left(1-\frac{v}{c}\cos\vartheta\right)^2 d\vartheta + \int_{\pi}^{\pi+\varphi} G_0\left(1-\frac{v}{c}\cos\vartheta\right)^2 d\vartheta = \\ = \int_{\pi+\varphi}^{2\pi} G_0\left(1-\frac{v}{c}\cos\vartheta\right)^2 d\vartheta + \int_{0}^{\pi-\varphi} G_0\left(1-\frac{v}{c}\cos\vartheta\right)^2 d\vartheta \qquad (3.3)$$

Where from

$$\frac{v}{c} = \frac{-8\sin\varphi + \sqrt{\left(64\sin^2\varphi + 8(\pi-2\varphi)\left[\sin 2\varphi - (\pi-2\varphi)\right]\right)}}{2\left[\sin 2\varphi - (\pi-2\varphi)\right]} \qquad (3.4)$$

Substituting for φ we get the Table 1 which represents the dependency of $\frac{r_c}{r}$ on $\frac{v}{c}$, see fig. 3.4.

Table 1

φ°	$\cos = \frac{r_c}{r}$	v/c
89.9999999	0	0.00000000000
80	0.1736	0.0886197118
60	0.5	0.30472815857

40	0.7660	0.765471182633
37	0.7986	0.927252176745
36	0.8090	1.00053925635
32.123	0.847	1.89550406058

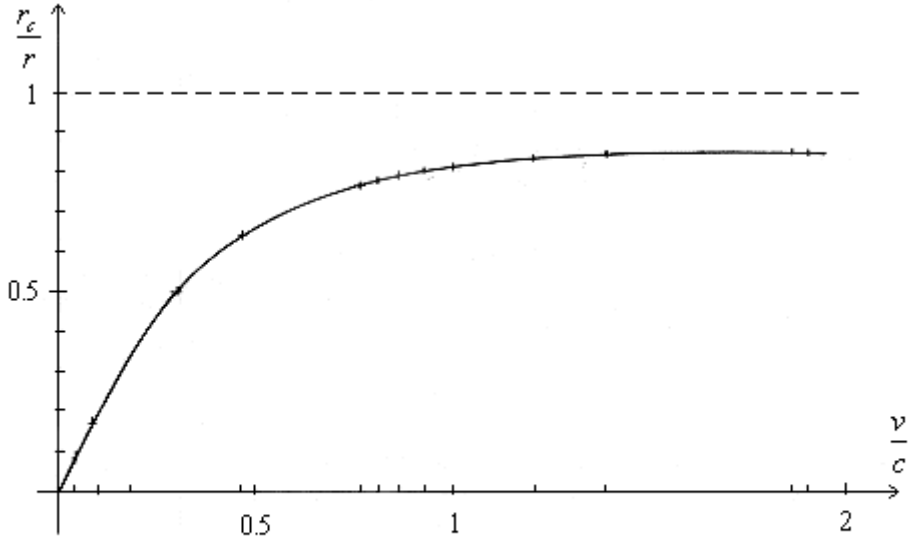

Fig. 3.4. The dependence of $\frac{r_c}{r}$ on $\frac{v}{c}$

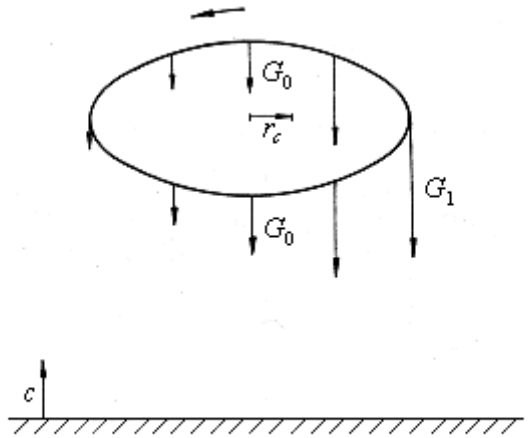

Fig. 3. 7. The rotating "circle" may be getting off the Earth

Any inclination of the circle from the horizontal level when projected at the vertical level results in ellipse. The shift of center of gravity increases in line with the inclination of the „circle" from the horizontal to vertical level. It means that the more the rotating "circle" may be getting off the Earth (see fig. 3.7) . Conversely, if we want to stop the getting off the Earth, it is enough to level the "circle" into the horizontal level. It is evident that the highest speed of getting away from the Earth will be achieved in the rotation in vertical level. If the rotation level of the "circle" forms with the horizontal level an angle of $\varepsilon^\circ = 45^o$, the "circle" acquires the average speed of getting off the Earth i. e. by deceleration of the rotating "circle" needs straightening more in the horizontal level. During acceleration it is necessary to swing out the rotating "circle" so that it rotates closer to the vertical level. The real rotating body will qualitatively behave in a way similar to our "circle".

Corrections for real bodies

$I = mr^2$ This is the calculation for an ideal circle **and** for an **thin ring**.

$I = 0.4\ mr^2$ This is the calculation for an **solid ball**.

$I_{circle} = mr^2$, $I_{ball} = 0{,}4\ mr^2$

$0{,}5\ I_{circle}\ \omega^2_{\ circle} = 0{,}5\ I_{ball}\ \omega^2_{\ ball}$

$mr^2\,\omega^2_{circle} = 0{,}4\,mr^2\,\omega^2_{ball}$ $\quad r\,\omega_{circle} = v_{rot}$, $r\,\omega_{ball} = v_{real}$

$v^2_{rot\ circl} = 0{,}4\,v^2_{rot\ real\ ball}$

$2{,}5^{0,5}\,v_{rot\ circl} = v_{rot\ real\ ball}$

$1{,}581138830084189665994467722164\,v_{rot\ circl} = v_{rot\ real\ ball}$, $v_{rot\ circl} = 0{,}63245553203367586639977870888654\,v_{rot\ real\ ball}$ ..... for neutron star

v_{rot}/c, v_{rot} ....(as a surface feet speed per seconde), v_{climb} , $v_{transl} = v_{climb} \sin \varepsilon°$

$v_{climb} = v_{rot}\,(\cos\varphi)/(2\,\pi)$

v_{real} = average $v_{transl} = v_{climb} \sin 45° = 0{,}70710678118654752440084436210485\,v_{climb} = 0{,}70710678118654752440084436210485\,v_{rot}\,(\cos\varphi)/(2\,\pi)$

$v_{real} = 0{,}11253953951963825869439989887584\,(\cos\varphi)\,v_{rot}$

If the rotation level of the "circle" forms with the horizontal level an angle of $\varepsilon°$, $v_{transl} = v_{climb} \sin \varepsilon°$.

For $\varepsilon° = 90°$ $v_{transl} = v_{climb}$.

For $\varepsilon° = 0°$ $v_{transl} = 0$ m/s .

For $\varepsilon° = 45°$ average $v_{transl} = v_{climb} \sin 45°$

average $v_{transl} = 0{,}70710678118654752440084436210485\,v_{climb}$.

For $\varepsilon° = 10°$ minimal $v_{transl} = 0{,}17364817766693034885171662676931\,v_{climb}$.

For $\varepsilon° = 30°$ $v_{transl} = 0{,}5\,v_{climb}$.

For $\varepsilon° = 80°$ maximal $\mathbf{v_{transl}} = 0{,}984807753012208059366743024589 52\ \mathbf{v_{climb}}$.

At each revolution, the center of gravity moves on:

For r= 0,5m shift the center of gravity

Whell of bicycle $r_c = 0{,}5m * \mathbf{1{,}7453292519943294883140751983588e\text{-}8 = 1{,}52072115007809288776156558802 81e\text{-}10\ m}$

Whell (car) $\mathbf{r_c = r\cos\varphi° = 8{,}726\ e\text{-}8m = 0{,}08\ \mu m}$

Whell (aeroplane) $\mathbf{r_c = r\cos\varphi° = 8{,}7267e\text{-}7m = 0{,}87\ \mu m}$

Earth $\mathbf{r_c = r\cos\varphi° = 11{,}19\ m}$, see you **Table 6** in this article.

The centers of gravity rises every second f $r_c = f * r$ $\mathbf{\cos\varphi = \omega\ r\ \cos\varphi/2\pi = v_{rot}\ (\cos\varphi)/\ (2\ \pi\ ) = v_{climb}}$

$\mathbf{v_{rot\ circl} = 0{,}6324555320336758663997787088865\ v_{rot\ real\ ball}}$, $\mathbf{v_{rot}/c}$, $\mathbf{v_{rot}}$ **(as a surface feet speed per seconde),** $\mathbf{v_{climb}}$, $\mathbf{v_{transl} = v_{climb} \sin \varepsilon°}$

$\mathbf{v_{transl} = v_{climb} \sin \varepsilon}$, average $\mathbf{v_{transl} = v_{climb} \sin 45° = 0{,}70710678118654752440084436210485\ v_{climb}}$

$\mathbf{v_{rot} = \omega\ r \quad \omega = v/r = 2\pi f}$, **Neutron star** $\mathbf{r_{min} = 10\ km,\ r_{max} = 15\ km}$

$\mathbf{v_{rot\ circl} = 0{,}6324555320336758663997787088865\ v_{rot\ real\ ball} = 0{,}4^{0{,}5}\ v_{rot\ real\ ball} = (2/5)^{0{,}5}\ v_{rot\ real\ ball}}$

Table 2 Calculation v_{rot}

T	f	$v_{rot\ real\ ball} = 2\ \pi\ r\ f$ $v_{rot\ real\ ball\ min}$ = 62831,8530717958647692528676655 9 m*f $v_{rot\ real\ ball\ max}$ =	$v_{rot\ circl}$= 0,6324555320336758663997787088865 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ = 39738,353063184404937734202681247 m*f $v_{rot\ circl\ mim}/c$ = $v_{rot\ circl\ max}$ =	

		94247,779607693797153879301498385 m*f	59607,52959477660740660130402187 1 m*f $v_{rot\ circl\ max}$ /c =
0,001s	1000 Hz	$v_{rot\ real\ ball\ min}$ = 62831853,071795864769252867665 59 m/s = 62831,8531 km/s $v_{rot\ real\ ball\ max}$ = 94247779,607693797153879301 49838 m/s =94247,7796 km/s	$v_{rot\ circl}$= 0,6324555320336758663997787088865 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ =39738353,06318440493773420268124 m/s $v_{rot\ circl\ mim}$ /c = 0,13255287784185819957396727665924 $v_{rot\ circl\ max}$ =59607529,5947766074066013040218 7 m/s $v_{rot\ circl\ max}$ /c = 0,19882931676278729936095091498 89
0,001557708 s	f =641,9688414003137943696764 7338269 Hz	$v_{rot\ real\ ball\ min}$ = 40336091,919535538604958610 770171 m/s = 40336,0919 km/s $v_{rot\ real\ ball\ max}$ =60504137,879303307907437916155253 m/s = 60504,1379 km/s	$v_{rot\ circl}$= 0,6324555320336758663997787088865 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ =25510784,475129103103877108342022 m/s 39738,353063184404937734202681247 m*f $v_{rot\ circl\ mim}$ /c =0,08509481741241503515034093466761 6 $v_{rot\ circl\ max}$ = 38266176,71269365465581566251304 m/s 59607,52959477660740660130402187 1 m*f $v_{rot\ circl\ max}$ /c = 0,12764222611862255272551140200145
0,0015578065 s	f =641,9282497537402751882213869 3092 Hz	$v_{rot\ real\ ball\ min}$ = 40333541,471162088981688590762452 m/s = 40333,5415 km/s $v_{rot\ real\ ball\ max}$ =60500312,206743133472532886143675 m/s =60500,3122 km/s	$v_{rot\ circl}$= 0,6324555320336758663997787088865 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ =25509171,429946148599157984435961 m/s 39738,353063184404937734202681247 m*f $v_{rot\ circl\ mim}$ /c = 0,08508943687284537558032225225612 9 $v_{rot\ circl\ max}$ =38263757,144919222898736976653948 m/s 59607,52959477660740660130402187 1 m*f $v_{rot\ circl\ max}$ /c =0,12763415530926806337048337838422
0,01s	100Hz	$v_{rot\ real\ ball\ min}$ = 6283185,3071795864769252867 66559 m/s = 6283,1853 km/s $v_{rot\ real\ ball\ max}$ = 9424777,960769379715387930149838 m/s = 9424,77796 km/s	$v_{rot\ circl}$= 0,6324555320336758663997787088865 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ =3973835,306318440493773420268124 m/s 39738,353063184404937734202681247 m*f $v_{rot\ circl\ mim}$ /c = 0,01325528778418581995739672766592 4 $v_{rot\ circl\ max}$ =5960752,95947766074066013040218 7 m/s 59607,52959477660740660130402187 1 m*f $v_{rot\ circl\ max}$ /c =0,01988293167627872993609509149889

Table 3 Extreme values for neutron stars

Neutron star r_{min} = 10km, r_{max} = 15km,	$v_{rot\ real\ ball\ min}$ = 62831,85307179586476925286766559 *f $v_{rot\ real\ ball\ max}$ = 94247,77960769379715387930149838 5 *f	$v_{rot\ circl}$= 0,63245553203367586639977870888 65 $v_{rot\ real\ ball}$ $v_{rot\ circl\ mim}$ /c $v_{rot\ circl\ max}$ /c	$v_{climb} = v_{rot} (\cos\varphi)/(2\pi)$ $v_{transl} = v_{climb} \sin 45°$
T = 0,01s r_{min} = 10km f = 100Hz r_{max} = 15km	$v_{rot\ real\ ball\ min}$ = 6283185,30717958647692528676655 9 m/s = 6283,1853 km/s $v_{rot\ real\ ball\ max}$ = 9424777,96076937971538793014983 8 m/s = 9424,77796 km/s	$v_{rot\ circl\ mim}$ =3973835,30631844049377342026812 4 m/s $v_{rot\ circl\ mim}$ /c = 0,01325528778418581995739672766592 4 $v_{rot\ circl\ max}$ =5960752,95947766074066013040218 7 m/s $v_{rot\ circl\ max}$ /c =0,01988293167627872993609509149889	v_{climb} =16,5557 km/s v_{transl} = 11,707 km/s v_{climb} = 28,5411 km/s v_{transl} = 20,182 km/s
T = 0,001s r_{min} = 10km f = 1000 Hz r_{max} = 15km	$v_{rot\ real\ ball\ min}$ = 62831853,0717958647692528676655 9 m/s = 62831,8531 km/s $v_{rot\ real\ ball\ max}$ = 94247779,60769379715387930149838 m/s =94247,7796 km/s	$v_{rot\ circl\ mim}$ =39738353,06318440493773420268124 m/s $v_{rot\ circl\ mim}$ /c = 0,13255287784185819957396727665924 $v_{rot\ circl\ max}$ =59607529,59477660740660130402187 m/s $v_{rot\ circl\ max}$ /c = 0,19882931676278729936095091498 89	v_{climb} =1603,422 km/s v_{transl} =1133,791 km/s v_{climb} = 3431,081 km/s v_{transl} = 2426,141 km/s

Table 4 Calculation of extreme velocities

Fast-spining body	$\varphi°$	$\cos = \frac{r_c}{r}$	v_{rot} /c, v_{rot} ....(Surface feet speed per seconde), v_{climb} , $v_{transl} = v_{climb} \sin \varepsilon°$ For ε° = 45°, sin 45° =0,70710678118654752440084436210485 $v_{rot\ circl}$ = 0,63245553203367586639977870888654 $v_{rot\ real\ ball}$
Neutron star T = 0,01s f = 100Hz if r_{min} = 10km,		$v_{rot\ real\ ball\ min}$ = 6283185,307179586476925286 766559 m/s = 6283,1853 km/s $v_{rot\ real\ ball\ max}$ =	$v_{rot\ circl\ mim}$ =3973835,30631844049377342026812 4 m/s $v_{rot\ circl\ mim}$ /c = 0,01325528778418581995739672766592 4 $v_{rot\ circl\ max}$ =5960752,95947766074066013040218 7 m/s

if r_{max} = 15km,		9424777,960769379715387930149838 m/s = 9424,77796 km/s	$v_{rot\ circl\ max}$ /c =0,019882931676278729936095091498 89
Neutron star T = 0,01s f = 100Hz if r_{min} = 10km,	88,5°	0,026176948307873152610611685554113 (cosϕ)/(2 π) = =0,004166190718259037509128921034722 3	$v_{rot\ circl\ mim}$ /c = 0,013255287784185819957396727665924 v_{climb} = v_{rot} (cosϕ)/(2 π) =16555,75576907394593683145206195 m/s = 16,5557 km/s v_{transl} = v_{climb} sin ε°=16,5557* sin 45° =11,707 km/s
Neutron star T = 0,01s f = 100Hz if r_{max} = 15km	88,276°	0,030084936125369204818494256092281 (cosϕ)/(2 π) = =0,004788166296956441953669002658569 1	$v_{rot\ circl\ max}$ /c =0,019882931676278729936095091498 89 $v_{rot\ circl\ max}$ =5960752,959477660740660130402187 m/s v_{climb} = v_{rot} (cosϕ)/(2 π) =28541,076425054303129252336458349 = 28,5411 km/s v_{transl} = v_{climb} sin ε°= 28,5411 * sin 45° =20,182 km/s
Neutron star T = 0,001s f = 1000Hz if r_{min} = 10km,	75,3139°	0,2535232772218520205226351124125 5 (cosϕ)/(2 π) = =0,040349482758714663366244713765043	$v_{rot\ circl\ mim}$ /c = 0,132552877841858199573967276659 24 $v_{rot\ circl\ mim}$ =39738353,06318440493773420268124 m/s v_{climb} = v_{rot} (cosϕ)/(2 π) =1603421,9917826751767787525741 8 m/s =1603,422 km/s v_{transl} = v_{climb} sin ε°= 1603,422*sin 45° = 1133,791 km/s
Neutron star T = 0,001s f = 1000Hz if r_{max} = 15km,	68,79735°	0,3616676908133563606407565363636272 (cosφ)/ (2 π) = =0,05756120074957692910051727045996 9	$v_{rot\ circl\ max}$ /c = 0,198829316762787299360950914988 9 $v_{rot\ circl\ max}$ =59607529,594776607406601304021 87 m/s v_{climb} = v_{rot} (cosϕ)/(2 π) = 3431080,97719128423917370897567 m/s = 3431,081 km/s v_{transl} = v_{climb} sin ε°= 3431,081 *sin 45° = 2426,141 km/s

Table 5 Summary values for neutron stars

Fast-spining body	φ°	$\cos = \frac{r_c}{r}$	v_{rot} /c, v_{rot} ....(Surface feet speed per seconde), v_{climb} , v_{transl} = v_{climb} sin ε° For ε° = 45°, sin 45° =0,707106781186547524400844362104 85 $v_{rot\ circl}$ = 0,6324555320336758663997787088865 4 $v_{rot\ real\ ball}$
	89°	0,017452406437283512819418978516316	0.00872797564043311485512282091722163996737634293427878256420 0… v_{rot}/c = 0,008727975640433114855122820917221639967376 34

		(cosϕ)/(2 π) = =0,0027776367533424853071435936608051	**v_{rot} =2616581,2706095676870135843746012 m/s =2616,58 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 7267,912305352714561021025119023 2 m/s** **v_{climb} =7,2679 km/s** average **v_{transl} = v_{climb} sin** 45° = **5,139 km/s**
Neutron star T = 0,01s **f = 100Hz** if **r_{min} = 10km,** **if r_{max} = 15km,**		**$v_{rot\ real\ ball\ min}$ = 6283185,307179586476925286766559 m/s = 6283,1853 km/s** **$v_{rot\ real\ ball\ max}$ = 9424777,960769379715387930149838 m/s = 9424,77796 km/s**	**$v_{rot\ circl\ mim}$ =3973835,306318440493773420268124 m/s** **$v_{rot\ circl\ mim}$ /c = 0,013255287784185819957396727665924** **$v_{rot\ circl\ max}$ =5960752,959477660740660130402187 m/s** **$v_{rot\ circl\ max}$ /c =0,019882931676278729936095091498 89**
Neutron star T = 0,01s **f = 100Hz** if **r_{min} = 10km,**	**88,5°**	**0,026176948307873152610611685554113** **(cosϕ)/(2 π) = =0,004166190718259037509128921034722 3**	**$v_{rot\ circl\ mim}$ /c = 0,013255287784185819957396727665924** **v_{climb} = v_{rot} (cosϕ)/(2 π) =16555,75576907394593683145206195 m/s = 16,5557 km/s** average **v_{transl} = v_{climb} sin** ε°=**16,5557* sin 45° =11,707 km/s**
Neutron star T = 0,01s **f = 100Hz** **if r_{max} = 15km**	**88,276°**	**0,030084936125369204818494256092281** **(cosϕ)/(2 π) = =0,004788166296956441953669002658569 1**	**$v_{rot\ circl\ max}$ /c =0,019882931676278729936095091498 89** **$v_{rot\ circl\ max}$ =5960752,959477660740660130402187 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =28541,07642505430312925233645834 9 = 28,5411 km/s** average **v_{transl} = v_{climb} sin** ε°= **28,5411 * sin 45° =20,182 km/s**
	88°	**0,034899496702500971645995181625333** **(cosϕ)/(2 π) = =0,034899496702500971645995181625333**	0.017463933237681592327144152660111110344490850835546791955029… **v_{rot}/c = 0,017463933237681592327144152660111110344490 85** **v_{rot} =5235555,4716724627851084856462686 m/s = 5235,555 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 29080,512826926810132624625022137** **v_{climb} =29,0805 km/s** average **v_{transl} = v_{climb} sin** 45° =**20,563 km/s**
	87°	**0,052335956242943832722118629609078** **(cosϕ)/(2 π) = =0,008329526137505650120821257224627 9**	0.026215883170382501294797482593212593293946245879689283725651… **v_{rot}/c = 0,026215883170382501294797482593212593293 9** **v_{rot} =7859324,0542898028633555199187677 m/s = 7859,324 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =65464,44513333378808052229467950 4 m/s** **v_{climb} =65,4644 km/s** average **v_{transl} = v_{climb} sin** 45° =**46,290km/s**

	86°	**0,069756473744125300775958835194143** **(cosϕ)/(2 π) =** **=0,011102087609037553406625303034432**	0.034991892902415155481444102185912156157984547716105394726321… **v_{rot}/c = 0,034991892902415155481444102185912156157 98** **v_{rot} =10490305,5832877935982343 m/s = 10490,305583 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =116464,29163123687749909943954997 m/s** **v_{climb} =116,4643 km/s** average **v_{transl} = v_{climb} sin** 45° =**82,353 km/s**
	85°	**0,087155742747658173558064270837474** **(cosϕ)/(2 π) =** **=0,013871267271354062401003300234 27**	0.043800116133369449162243192210722769426360805129544737054659… **v_{rot}/c = 0,043800116133369449162243192210722769426 36** **v_{rot} = 13130944,476308282986454927386402 m/s = 13130,94 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 182142,84043209699937457117013179 m/s** **v_{climb} =182,1428 km/s** average **v_{transl} = v_{climb} sin** 45° = **128,794 km/s**
	84°	**0,104528463267653471399834154802 5** **(cosϕ)/(2 π) =** **=0,016636221622846660213779183752024**	0.052648822689310354155112108480039421972918532818959442949836… **v_{rot}/c = 0,052648822689310354155112108480** **v_{rot} = 15783719,964834521397011572266782 m/s = 15783,72 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 262581,46336793659223664313126767 m/s** **v_{climb} =262,5815 km/s** average **v_{transl} = v_{climb} sin** 45° =**185,673 km/s**
	83°	**0,121869343405147481112893919231 53** **(cosϕ)/(2 π) =** **=0,019396108414292897495265636178703**	0.061546429419037647937207344430091477007293160179421032989100… **v_{rot}/c = 0,061546429419037647937207344430091477** **v_{rot} = 18451155,356656808469634019442322 m/s = 18451,1554 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =357880,60966667659085697677318286 m/s** **v_{climb} =357,8801 km/s** average **v_{transl} = v_{climb} sin** 45° =**253,059 km/s**
	82°	**0,139173100960065444112496663301 11** **(cosϕ)/(2 π) =** **=0,022150086963221819876716065270417**	0.070501532377454639860328775364899457683965648939309596758992… **v_{rot}/c = 0,070501532377454639860328775364899** **v_{rot} = 21135827,684203710267232740254503 m/s = 21135,8277 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 468160,42124478343051766323233437 m/s** **v_{climb} = 468,1604 km/s** average **v_{transl} = v_{climb} sin** 45° =**331,039 km/s**

	81°	**0,1564344650402308690101053194671 7** **(cosϕ)/(2 π) =** **=0,0248973183810890343548415029301 17**	0.079522940598973804892724421154906775310115207065009741007176… **v_{rot}/c = 0,079522940598973804892724421154 91** **v_{rot} = 23840377,829554349246402280534385m/s = 23840,4 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 593561,47714787099719017703866065 m/s** **v_{climb} =593,5615 km/s** average **v_{transl} = v_{climb} sin** 45° =**419,711 km/s**
	80°	**0,1736481776669303488517166267693 1** **(cosϕ)/(2 π) =** **=0,0276369658345916302488224223623 46**	0.088619711790676205327338629151343180429432664295312521755495… **v_{rot}/c = 0,088619711790676205327338629151343** **v_{rot} =26567521,224978401077195542231529 m/s=26567,52 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 734245,67640451604715133095598 11 m/s** **v_{climb} =734,2457 km/s** average **v_{transl} = v_{climb} sin** 45° =**519,19 km/s**
	79°	**0,1908089953765448124051404879583 9** **(cosϕ)/(2 π) =** **=0,0303681948005757098531368023969 38**	0.097801190307943836001438986564057051864042361089181828754607… **v_{rot}/c = 0,097801190307943836001438986564057** **v_{rot} =29320059,237744259520820285319051 m/s=29320,1 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 890397,27049623703270774917444291 m/s** **v_{climb} =890,3973 km/s** average **v_{transl} = v_{climb} sin** 45° =**629,606 km/s**
	78°	**0,2079116908177593371017422844051 3** **(cosϕ)/(2 π) =** **=0,0330901733202402253221199199926 31**	0.107077047815431524891573511759277128251736618733142730990486… **v_{rot}/c = 0,107077047815431524891573511759277** **v_{rot} =32100891,359971747177933006577923 m/s=32100,9 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1062224,05883566707138830983654 41 m/s** **v_{climb} = 1062,2241 km/s** average **v_{transl} = v_{climb} sin** 45° =**751,1059 km/s**
	77°	**0,2249510543438649980511072083428** **(cosϕ)/(2 π) =** **=0,0358020722525596888350129712598 94**	0.116457327084702694566820976533792415862359393619564735642381… **v_{rot}/c = 0,116457327084702694566820976 53** **v_{rot} =34913028,338832995003410505800788 m/s=34913,028 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =1249958,76314256285663139420529 27 m/s** **v_{climb} =1249,9588 km/s** average **v_{transl} = v_{climb} sin** 45° =**883,854 km/s**
	76°	**0,2419218955996677225604422**	0.125952489438069937853005346598758863645937973547879337155578…

		37410035 **(cosϕ)/(2 π) =** **=0,038503065526848561029023328888899**	**v_{rot}/c = 0,125952489438069937853005346598758 86** **v_{rot}=37759606,39985802544485971554375 6 m/s=37759,6 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1453860,59948174384126258832865 01 m/s** **v_{climb} =1453,8606 km/s** average **v_{transl} = v_{climb} sin** 45° =**1028,035 km/s**
Neutron star T = 0,001s **f = 1000Hz** if **r_{min} = 10km,**	**75,3139°**	**0,25352327722185202052263511241255** **(cosϕ)/(2 π) =** **=0,04034948275871466336624 4713765043**	**$v_{rot\ circl\ mim}$ /c = 0,13255287784185819957396727665924** **$v_{rot\ circl\ mim}$ =39738353,06318440493773420268124 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =1603421,99178267517677875257418 m/s =1603,422 km/s** average **v_{transl} = v_{climb} sin** ε°= **1603,422*sin 45° = 1133,791 km/s**
	75°	**0,25881904510252076234889883762405** **(cosϕ)/(2 π) =** **=0,04119233039439038414103 3556846236**	0.13557346641795506797487715467643740757463532337433552742514 2… **v_{rot}/c = 0,13557346641795506797487715467643 74** **v_{rot} =40643902,73701920516174550444836 4 m/s=40643,9 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1674217,07006076272880413370148 32 m/s** **v_{climb} =1674,2171 km/s** average **v_{transl} = v_{climb} sin** 45° =**1183,850 km/s**
	74°	**0,27563735581699918564997 15746113** **(cosϕ)/(2 π) =** **=0,04386904767905501118641 8070235537**	0.14533171634464560036672395871647865287561283379131612452289 1… **v_{rot}/c = 0,14533171634464560036672395 87** **v_{rot} =43569352,46832007967282587699096 m/s=43569,4 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1911346,00077828671397102648284 04 m/s** **v_{climb} = 1911,3460 km/s** average **v_{transl} = v_{climb} sin** 45° =**1351,526 km/s**
	73°	**0,29237170472273672809746869537714** **(cosϕ)/(2 π) =** **=0,04653240202682759073917 595903321**	0.15523928652544897127399629138633845952728277743958319224050 4… **v_{rot}/c = 0,15523928652544897127399629 1386 33** **v_{rot} = 46539567,28563062665180273967749 3m/s = 46539,57km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =2165597,85508955760719083973197 86 m/s** **v_{climb} =2165,5979 km/s** average **v_{transl} = v_{climb} sin** 45° =**1531,309 km/s**
	72°	**0,30901699437494742410229341718282** **(cosϕ)/(2 π) =** **=24373580,0491815821541732**	0.16530888199838790343947912002676731771447248838088830745390 6… **v_{rot}/c = 0,16530888199838790343947912** **v_{rot} =49558356,06352866160958809963227 2 m/s=49558,4 km/s**

		98367374393707347	**v_{climb} = v_{rot} (cosϕ)/(2 π) = 2437358,360164207296281191398136 5 m/s** **v_{climb} =2437,358 km/s** average **v_{transl} = v_{climb} sin** 45° =**1723,47 km/s**
	71°	**0,3255681544571566687140089357947 2** **(cosϕ)/(2 π) = =0,05181578109516216042074419853012**	0.17555394183806041140090507163179532185938312593281154782961 6… **v_{rot}/c = 0,17555394183806041140090507163** **v_{rot} =52629747,735221168686368554848924 m/s=52629,75 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =2727051,4877418265600993462429554 m/s** **v_{climb} =2727,051 km/s** average **v_{transl} = v_{climb} sin** 45° =**1928,316 km/s**
fí =π/2.57142857 = 70°	**70°**	**0,3420201433256687330440996146822 6** **(cosφ)/ (2 π) = =0,05443419644727869355514996793263 7**	0.18598872381584902230023284137741379236438622876283494731294 4… **0,18598872381584902230023284137 7** **v_{rot}/c =0,18598872381584902230023284137 7** **v_{rot} = 55758016,673036517752283617488735 m/s = 55758,0167 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 3035142,8330907105752273290514717 m/s** **v_{climb} =3035,1428 km/s** average **v_{transl} = v_{climb} sin** 45° = **2146,17 km/s**
	69°	**0,3583679495453002734841377894134 7** **(cosφ)/ (2 π) = =0,05703603061584148399652412530414 5**	0.19662840169494000286640005349671502348612901863706743188905 7… **0,19662840169494000286640005349671502348** **v_{rot}/c =0,19662840169494000286640005349671502348** **v_{rot} = 58947711,856737429621845117648897 m/s = 58947,7119 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =3362143,4981946780860871259822083 m/s** **v_{climb} =3362,1435 km/s** average **v_{transl} = v_{climb} sin** 45° = **2377,3945 km/s**
Neutron star T = 0,001s **f = 1000Hz** if **r_{max} = 15km,**	**68,79735°**	**0,3616676908133563606407565363636272** **(cosφ)/ (2 π) = =0,05756120074957692910051727045996 9**	**$v_{rot\ circl\ max}$ /c = 0,19882931676278729936095091498 89** **$v_{rot\ circl\ max}$ =59607529,5947766074066013040218 7 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 3431080,9771912842391737089756 7 m/s = 3431,081 km/s** average **v_{transl} = v_{climb} sin** ε°= **3431,081 *sin 45° = 2426,141 km/s**
	68°	**0,3746065934159120354149637745012**	0.20748916822568494834581209646479018755329044768501995627786 6… **0,20748916822568494834581209646479018755**

		$(\cos\varphi)/(2\pi)$ = =0,059620491056958253972675499032576	v_{rot}/c =0,20748916822568494834581209646479018755 v_{rot} = 62203687,750753589398194042405076 m/s =62203,6878 km/s v_{climb} = v_{rot} $(\cos\phi)/(2\pi)$ =3708614,4092536280648771502316964 m/s v_{climb} =3708,6144 km/s average v_{transl} = v_{climb} sin ε°=2622,3864 km/s

Table 6. Summary values for spinning bodies

Fast-spining body shift the center of gravity r_c	φ°	$\cos = \frac{r_c}{r}$	v_{rot} /c, v_{rot} ....(as a surface feet speed per seconde), v_{climb} , v_{transl} = v_{climb} sin ε° $v_{rot\ circl}$ = 0,6324555320336758663997787088865 4 $v_{rot\ real\ ball}$
Ideal rotational circle Ring	89,9999999°	1,7453292519943295760375946128047e-9 $(\cos\varphi)/(2\pi)$ = =2,77777777777777777636751194545 85e-10	$9.761385225306725890874493380900799198121733067437675948\ldots \times 10^{-10}$ v_{rot}/c = 9,761385225306725890874493380900799198121733067437675948e-10 v_{rot}= 0,29263896701795871587575041401647 m/s v_{climb} = v_{rot} $(\cos\varphi)/(2\pi)$ = 8,12886019494329765908830191431 58e-11 = 81,288 pm /s average v_{transl} = v_{climb} sin 45° average v_{transl} = 0,70710678118654752440084436210485 v_{climb} average v_{transl} = 57,479 pm/s
Whell (bicycle) 1,52 e-10 m = 15,2 nm	89,9999990°	1,7453292519943294883140751983588e-8 $(\cos\varphi)/(2\pi)$ = =2,77777777777777763675119 45431892e-9	$9.761380831729904924918030540414632461944063307506919716\ldots \times 10^{-9}$ v_{rot}/c =9,761380831729904924918030540414632461944063307506919717e-9 v_{rot} = 2,92638835301839258954748182422 98 m/s v_{climb} = v_{rot} $(\cos\varphi)/(2\pi)$ =8,12885653616220122493334331251 22e-9 m/s = 8,1288 nm/s average v_{transl} = v_{climb} sin 45° = 5,7479 nm/s
Whell (car) 8,726 e-8m= 0,08 µm	89,999990°	1,7453292519943207159621337555219e-7 $(\cos\varphi)/(2\pi)$ = =2,77777777777776367511945	$9.761336896612234748403147466839164863682885596493868382 7\ldots \times 10^{-8}$ 9,761336896612234748403147466839164863682885596493868382 7e-8 v_{rot} = 29,263751816014737280967911540201 m/s = 105,34950 km/hod

		43190663e-8	$v_{climb} = v_{rot}(\cos\varphi)/(2\pi)$ =8,12881994889294130837732971947 73e-7 m/s = 0,81288 μm/s average $v_{transl} = v_{climb} \sin 45°$ =0,57479 μm/s
Whell (aeroplane) 8,7267e-7m=0,87 μm	**89,99990°**	**1,7453292519934434807679896054328e-6** $(\cos\varphi)/(2\pi)$ = 2,7777777777763675119454321194272e-7	$9.760897610484789062034911675250857698029540259001329408 9\ldots \times 10^{-7}$ **9,760897610484789062034911675250857698029540259001329408 9e-7** v_{rot}/c=9,760897610484789062034911675250857698029540259001329408 9e-7 v_{rot} = 292,62 m/s = 1053,45km/hod (X-15 ... 7274 km/h) $v_{climb} = v_{rot}(\cos\varphi)/(2\pi)$ =8,12833333332920661345472346786 73e-5 m/s = 8,13 μm/s average $v_{transl} = v_{climb} \sin 45°$ =5,7476 μm/s
Earth ellipsoid **Equatorial radius (m) 6,378,136.6** **r = 6378136,6 m** r_c = rcos φ° = = 11,189834512772133613470204759754 m r_c = rcos φ° = 11,19 m delta =5,2e-7° 89,99990°- 5,2e-7° = =89,9998995°	**89,9998995°**	**1,7544049641038000994632515019754e-6** $(\cos\varphi)/(2\pi)$ = = 2,7922222222207898416438329958426e-7	9,8119569088313304220127204635308e-7 $v_{rot\ circl}/c$ = 9,8119569088313304220127204635308e-7 $v_{rot\ circl}$ = 0,6324555320336758663997787088865 4 $v_{rot\ real\ ball}$ $v_{rot\ real\ Earth}$ = 465,1 m/s $v_{rot\ circl}$ =294,155067948862645462537077502 88 m/s $v_{rot\ circl}/c$ = 9,8119569088313304220127204635308e-7 φ = 89,9998995° $v_{climb} = v_{rot\ circl}(\cos\phi)/(2\pi)$ = 8,213463175056806891573638145645 5e-5 m/s v_{climb} =82,13 μm/s .....for Earth 90°- 23,5° = 66,5° = ε° average $v_{transl} = v_{climb} \sin 66{,}5°$ =7,532239150277072460012348994765 4e-5 m/s 86164,09205s* 7,532239150277072460012348994765 4e-5 m/s = 6,49m /sidereal day 86636,55535s* 7,532239150277072460012348994765 4e-5 m/s =6,52567 m/ solar day bobbing the earth ?
Ideal rotational circle Ring	**89,99973°**	**4,7123889803672488270613157913787e-6** $(\cos\varphi)/(2\pi)$ = =7,4999999999722417376219669997286e-7	$2.635218406015556961759217598 1\ldots \times 10^{-6}$ **2,635218406015556961759217598e-6** **v/c = 2,635218406015556961759217598e-6** v_{rot} = 790,018603306245807804807847861 28 m/s $v_{climb} = v_{rot}(\cos\varphi)/(2\pi)$ =0,000592513952477491401486195691 8711m/s = 0,6 mm/s average $v_{transl} = v_{climb} \sin 45°$ = 0,419 mm/s
	89,99965°	**6,1086523819421621465572954208824e-6**	$3.415887297075835217417818712802945131872866540603556438 5\ldots \times 10^{-6}$

		(cosφ)/ (2 π) = =9,72222222216175707466050572589e-7	**3,4158872970758352174178187128029 4e-6** **v/c = 3,4158872970758352174178187128029 4e-6** **v_{rot} =1024,05724904134085223265228490 93 m/s = 1,024 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =9,95611214339556073514252263626 62e-4 m/s = 1 mm/s** average **v_{transl} = v_{climb} sin** 45° = **0,7 mm/s**
	89,99962°	**6,632251157529830524054490 2314347e-6** **(cosφ)/ (2 π) = =1,055555555547817144880324 2998124e-6**	3.708622045497858919866656776795754334145271316976548000 1… × 10^{-6} **3,7086220454978589198666567767e-6** **v/c = 3,7086220454978589198666567767e-6** **v_{rot} = 1111,81691881279095932405006732 93 m/s = 1,1118 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =0,00117358452540489787226194255824 62m/s =1,2 mm/s** average **v_{transl} = v_{climb} sin** 45° =**0,83 mm/s**
	89,999°	**1,745329251905719961354910 5685129e-5** **(cosφ)/ (2 π) = =2,777777777636751194545334 84209593e-6**	9.756511249448572387403928475507667223942026509723476285 7… × 10^{-6} **9,756511249448572387403928475507667223942026509723476285 7e-6** **v_{rot} = 2924,92848897683866061075195652 84 m/s= 2,92492848897683866 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =0,00812480135785650360847468577118 94 m/s = 8,12 mm/s** average **v_{transl} = v_{climb} sin** 45° = **5,74 mm/s**
	89,993490770 812547128466 198039896°	**1,136074808435855958343986 6031333e-4** **(cosφ)/ (2 π) = =1,808119218474455018623084570103e-5**	0.000056803740910557168763834837156854689596678628946106843 86… **0,000056803740910557168763834837156** **v_{rot}/c = 0,000056803740910557168763834837156** **v_{rot} = 17029,33311117109177323086729025 9 m/s = 17,029 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) = 0,30791064414346280821312874528876 m/s = 0,3 m/s** average **v_{transl} = v_{climb} sin** 45° =**0,2177257 m/s**
	89,99°	**1,745329243133368033406726 8304459e-4**	
fí = π/2.00021982 = 89,990109187099245921880726089396°	**89,990109187 099245921880 726089396°**	**0,000172627249959502966309 0642578526** **(cosφ)/ (2 π) = =2,747448014341508600913759333 8148e-5**	0.000086313626694525180932082216331553815936524555367552768417… **0,000086313626694525180932082216331** **v_{rot} = 25876,17430564611913452365859272 7 m/s = 25,876 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =0,71093443714802195087076198672 85 m/s = 0,71 m/s** average **v_{transl} = v_{climb} sin** 45° = **0,503 m/s**
fí = π/2.0005 = 89,977505°	**89,977505°**	**3,926118051496627900381389 5333483e-4**	0.000198144050724876985568508305538126217760311746639807139790… **0,000198144050724876985568508305538**

		(cosφ)/ (2 π) = =6,24861095058008814787968024 59618e-5	**v_{rot}/c =0,00019814405072487698556850830553 8** **v_{rot} =59402,092004887553251213632149364 m/s = 59,4 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =3,71180562589106268295535185252 13 m/s = 3,71 m/s** average **v_{transl} = v_{climb} sin** 45° = **2,625 m/s**
fí = π/2.0010 = 89,955022°	**89,955022°**	**7,850141103348687162626247 6088787e-4** **(cosφ)/ (2 π) = =1,249388760566808767017955431 6626e-4**	0.0003924533290370021522966781924012773323088235901630540304 95… **0,0003924533290370021522966781924012 77** **v_{rot}/c =0,0003924533290370021522966781924012 77** **v_{rot} = 117654,548162285648188311500414 68 m/s = 117,654 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =14,699627010352597413371053434747 m/s = 14,7 m/s** average **v_{transl} = v_{climb} sin** 45° =**10,394 m/s**
	89,9°	**0,001745328365898308835778 20272085** **(cosφ)/ (2 π) = =2,777776367512160227658585 2336932e-4**	0.0009341454906001047234594358053483698961556659772561156720 53… **0,0009341454906001047234594358053483698961556659772561156720 53** **v_{rot}=280049,772756621290103314523274 16 m/s=280,05 km/s** **v_{climb} = v_{rot} (cosφ)/ (2 π) =77,791564049049341778880429184767 m/s = 77,79 m/s** average **v_{transl} = v_{climb} sin** 45° = **55,007 m/s**
	89°	**0,017452406437283512819418 978516316** **(cosϕ)/(2 π) = =0,002777636753342485307143 5936608051**	0.0087279756404331148551228209172216399673763429342787825642 00… **v_{rot}/c = 0,0087279756404331148551228209172216399673763 4** **v_{rot} =2616581,270609567687013584374601 2 m/s =2616,58 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 7267,912305352714561021025119023 2 m/s** **v_{climb} =7,2679 km/s** average **v_{transl} = v_{climb} sin** 45° = **5,139 km/s**
Neutron star T = 0,01s f = 100Hz r_{min} = 10km,	**88,5°**	**0,026176948307873152610611 685554113** **(cosϕ)/(2 π) = =0,004166190718259037509121 89210347223**	**$v_{rot\ circl\ mim}$ /c = 0,013255287784185819957396727665924** **v_{climb} = v_{rot} (cosϕ)/(2 π) =16555,755769073945936831452061 95 m/s = 16,5557 km/s** average **v_{transl} = v_{climb} sin** ε°=**16,5557* sin 45° =11,707 km/s**
Neutron star T = 0,01s f = 100Hz r_{max} = 15km	**88,276°**	**0,030084936125369204818494 256092281** **(cosϕ)/(2 π) = =0,004788166296956441953669 0026585691**	**$v_{rot\ circl\ max}$ /c =0,019882931676278729936095091498 89** **$v_{rot\ circl\ max}$ =5960752,959477660740660130402187 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =28541,076425054303129252336458349 = 28,5411 km/s** average **v_{transl} = v_{climb} sin** ε°= **28,5411 * sin 45° =20,182 km/s**
	88°	**0,034899496702500971645995**	0.0174639332376815923271441526601111103444908508355467919550 29…

		181625333 **(cosϕ)/(2 π) =** **=0,034899496702500971645995181625333**	**v_{rot}/c = 0,017463933237681592327144152660111111034449085** **v_{rot} =5235555,4716724627851084856462686 m/s = 5235,555 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 29080,5128269268101326246250221 37** **v_{climb} =29,0805 km/s** average **v_{transl} = v_{climb} sin** 45° =**20,563 km/s**
	87°	**0,052335956242943832722118629609078** **(cosϕ)/(2 π) =** **=0,008329526137505650120821257224627 9**	0.026215883170382501294797482593212593293946245879689283725651… **v_{rot}/c = 0,026215883170382501294797482593212593293 9** **v_{rot} =7859324,0542898028633555199187677 m/s = 7859,324 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =65464,4451333337880805222946795 04 m/s** **v_{climb} =65,4644 km/s** average **v_{transl} = v_{climb} sin** 45° =**46,290km/s**
	86°	**0,069756473744125300775958835194143** **(cosϕ)/(2 π) =** **=0,011102087609037553406625303034432**	0.034991892902415155481444102185912156157984547716105394726321… **v_{rot}/c = 0,034991892902415155481444102185912156157 98** **v_{rot} =10490305,5832877935982343 m/s = 10490,305583 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =116464,2916312368774990994395 4997 m/s** **v_{climb} =116,4643 km/s** average **v_{transl} = v_{climb} sin** 45° =**82,353 km/s**
	85°	**0,087155742747658173558064270837474** **(cosϕ)/(2 π) =** **=0,013871267277135406240100330023427**	0.043800116133369449162243192210722769426360805129544737054659… **v_{rot}/c = 0,043800116133369449162243192210722769426 36** **v_{rot} = 13130944,4763082829864549273864 02 m/s = 13130,94 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 182142,8404320969993745711701317 9 m/s** **v_{climb} =182,1428 km/s** average **v_{transl} = v_{climb} sin** 45° = **128,794 km/s**
	84°	**0,104528463267653471399834154802 5** **(cosϕ)/(2 π) =** **=0,016636221622846660213779183752024**	0.052648822689310354155112108480039421972918532818959442949836… **v_{rot}/c = 0,052648822689310354155112108480** **v_{rot} = 15783719,9648345213970115722667 82 m/s = 15783,72 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 262581,4633679365922366431312676 7 m/s** **v_{climb} =262,5815 km/s** average **v_{transl} = v_{climb} sin** 45° =**185,673 km/s**
	83°	**0,121869343405147481112893919231 53**	0.061546429419037647937207344430091477007293160179421032989100… **v_{rot}/c = 0,061546429419037647937207344430091477**

		(cosϕ)/(2 π) = =0,019396108414292897495265636178703	**v_{rot} = 18451155,356656808469634019442322 m/s = 18451,1554 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =357880,60966667659085697677318286 m/s** **v_{climb} =357,8801 km/s** average **v_{transl} = v_{climb} sin** 45° =**253,059 km/s**
	82°	**0,13917310096006544411249666330111** **(cosϕ)/(2 π) = =0,022150086963221819876716065270417**	0.07050153237745463986032877536489945768396564893930959675899 2... **v_{rot}/c = 0,07050153237745463986032877536489 9** **v_{rot} = 21135827,684203710267232740254503 m/s = 21135,8277 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 468160,42124478343051766323233437 m/s** **v_{climb} = 468,1604 km/s** average **v_{transl} = v_{climb} sin** 45° =**331,039 km/s**
	81°	**0,15643446504023086901010531946717** **(cosϕ)/(2 π) = =0,02489731838108903435484 1502930117**	0.07952294059897380489272442115490677531011520706500974100717 6... **v_{rot}/c = 0,07952294059897380489272442115491** **v_{rot} = 23840377,829554349246402280534385m/s = 23840,4 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 593561,47714787099719017703866065 m/s** **v_{climb} =593,5615 km/s** average **v_{transl} = v_{climb} sin** 45° =**419,711 km/s**
	80°	**0,17364817766693034885171662676931** **(cosϕ)/(2 π) = =0,027636965834591630248822422362346**	0.08861971179067620532733862915134318042943266429531252175549 5... **v_{rot}/c = 0,08861971179067620532733862915134 3** **v_{rot} =26567521,224978401077195542231529 m/s=26567,52 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 734245,67640451604715133095598 11 m/s** **v_{climb} =734,2457 km/s** average **v_{transl} = v_{climb} sin** 45° =**519,19 km/s**
	79°	**0,19080899537654481240514048795839** **(cosϕ)/(2 π) = =0,030368194800575709853136802396938**	0.09780119030794383600143898656405705186404236108918182875460 7... **v_{rot}/c = 0,09780119030794383600143898656405 7** **v_{rot} =29320059,237744259520820285319051 m/s=29320,1 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 890397,27049623703270774917444291 m/s** **v_{climb} =890,3973 km/s** average **v_{transl} = v_{climb} sin** 45° =**629,606 km/s**
	78°	**0,20791169081775933710174228440513**	0.10707704781543152489157351175927712825173661873314273099048 6... **v_{rot}/c = 0,10707704781543152489157351175927 7**

		(cosϕ)/(2 π) = =0,0330901733202402253221 1991999263 1	**v_{rot} =32100891,359971747177933006577923 m/s=32100,9 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1062224,058835667071388309836544 1 m/s** **v_{climb} = 1062,2241 km/s** average **v_{transl} = v_{climb} sin** 45° =**751,1059 km/s**
	77°	**0,2249510543438649980511072083428** **(cosϕ)/(2 π) = =0,0358020722525596888350 12971259894**	0.116457327084702694566820976533792415862359393619564735642381… **v_{rot}/c = 0,116457327084702694566820976 53** **v_{rot} =34913028,338832995003410505800788 m/s=34913,028 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =1249958,763142562856631394205292 7 m/s** **v_{climb} =1249,9588 km/s** average **v_{transl} = v_{climb} sin** 45° =**883,854 km/s**
	76°	**0,2419218955996677225604423 7410035** **(cosϕ)/(2 π) = =0,0385030655268485610290233 2888899**	0.125952489438069937853005346598758863645937973547879337155578… **v_{rot}/c = 0,125952489438069937853005346598758 86** **v_{rot}=37759606,399858025444859715543756 m/s=37759,6 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1453860,599481743841262588328650 1 m/s** **v_{climb} =1453,8606 km/s** average **v_{transl} = v_{climb} sin** 45° =**1028,035 km/s**
Neutron star T = 0,001s f = 1000Hz r_{min} = 10km,	**75,3139°**	**0,2535232772218520205226351 1241255** **(cosϕ)/(2 π) = =0,0403494827587146633662 44713765043**	**$v_{rot\ circl\ mim}$ /c = 0,132552877841858199573967276659 24** **$v_{rot\ circl\ mim}$ =39738353,06318440493773420268124 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =1603421,991782675175678752574 18 m/s =1603,422 km/s** average **v_{transl} = v_{climb} sin** ε°= **1603,422*sin 45° = 1133,791 km/s**
	75°	**0,2588190451025207623488983762405** **(cosϕ)/(2 π) = =0,0411923303943903841410 33556846236**	0.135573466417955067974877154676437407574635233743355274251 42… **v_{rot}/c = 0,135573466417955067974877154676437 4** **v_{rot} =40643902,737019205161745504448364 m/s=40643,9 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1674217,070060762728804133701483 2 m/s** **v_{climb} =1674,2171 km/s** average **v_{transl} = v_{climb} sin** 45° =**1183,850 km/s**
	74°	**0,2756373558169991856499715746113** **(cosϕ)/(2 π) = =0,0438690476790550111864 18070235537**	0.145331716344645600366723958716478652875612833791316124522891… **v_{rot}/c = 0,145331716344645600366723958 7** **v_{rot} =43569352,46832007967282587699096 m/s=43569,4 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 1911346,000778286713971026482840 4 m/s**

			v_{climb} = 1911,3460 km/s average **v_{transl} = v_{climb} sin** 45° =**1351,526 km/s**
	73°	**0,2923717047227367280974686953771 4** **(cosϕ)/(2 π) =** **=0,0465324020268275907391759590332 1**	0.1552392865254489712739962913863314595272827774395831922405 04… **v_{rot}/c = 0,1552392865254489712739962913863 3** **v_{rot} = 46539567,2856306266518027396774 93m/s = 46539,57km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =2165597,8550895576071908397319786 m/s** **v_{climb} =2165,5979 km/s** average **v_{transl} = v_{climb} sin** 45° =**1531,309 km/s**
	72°	**0,3090169943749474241022934171828 2** **(cosϕ)/(2 π) =** **=24373580,049181582154173298367374393707347**	0.1653088819983879034394791200267673177144724883808883074539 06… **v_{rot}/c = 0,1653088819983879034394791 2** **v_{rot} =49558356,06352866160958809963227 2 m/s=49558,4 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 2437358,3601642072962811913981365 m/s** **v_{climb} =2437,358 km/s** average **v_{transl} = v_{climb} sin** 45° =**1723,47 km/s**
	71°	**0,3255681544571566687140089357947 2** **(cosϕ)/(2 π) =** **=0,0518157810951621604207441985301 2**	0.1755539418380604114009050716317953218593831259328115478296 16… **v_{rot}/c = 0,1755539418380604114009050716 3** **v_{rot} =52629747,7352211686868368554848924 m/s=52629,75 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =2727051,4877418265600993462429554 m/s** **v_{climb} =2727,051 km/s** average **v_{transl} = v_{climb} sin** 45° =**1928,316 km/s**
fí = π/2.57142857= 70°	**70°**	**0,3420201433256687330440996146822 6** **(cosφ)/ (2 π) =** **=0,0544341964472786935551499679326 37**	0.1859887238158490223002328413774137923643862287628349473129 44… **0,1859887238158490223002328413 77** **v_{rot}/c =0,1859887238158490223002328413 77** **v_{rot} = 55758016,6730365177522836174887 35 m/s = 55758,0167 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 3035142,8330907105752273290514717 m/s** **v_{climb} =3035,1428 km/s** average **v_{transl} = v_{climb} sin** 45° = **2146,17 km/s**
	69°	**0,3583679495453002734841377894134 7** **(cosφ)/ (2 π) =**	0.1966284016949400028664000534967150234861290186370674318890 57… **0,1966284016949400028664000534967 1** **v_{rot}/c =0,1966284016949400028664000534967 1**

		=0,05703603061584148399652 4125304145	**v_{rot} = 58947711,856737429621845117648897 m/s = 58947,7119 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =3362143,4981946780860871259822083 m/s** **v_{climb} =3362,1435 km/s** average **v_{transl} = v_{climb} sin** 45° = **2377,3945 km/s**
Neutron star T = 0,001s **f = 1000Hz** **r_{max} = 15km,**	**68,79735°**	**0,36166769081335636064075653636272** **(cosφ)/ (2 π) =** **=0,05756120074957692910051 7270459969**	**$v_{rot\ circl\ max}$ /c = 0,19882931676278729936095091498 89** **$v_{rot\ circl\ max}$ =59607529,5947766074066013040218 7 m/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 3431080,9771912842391737089756 7 m/s = 3431,081 km/s** average **v_{transl} = v_{climb} sin** ε°= **3431,081 *sin 45° = 2426,141 km/s**
	68°	**0,37460659341591203541496377 45012** **(cosφ)/ (2 π) =** **=0,059620491056958253972675 499032576**	0.207489168225684948345812096464790187553290447685019956277866… **0,20748916822568494834581209646479018755** **v_{rot}/c =0,20748916822568494834581209646479018755** **v_{rot} = 62203687,750753589398194042405076 m/s =62203,6878 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =3708614,4092536280648771502316964 m/s** **v_{climb} =3708,6144 km/s** average **v_{transl} = v_{climb} sin** 45° = **2622,3864 km/s**
	67°	**0,39073112848927375506208458888909** **(cosφ)/ (2 π) =** **=0,062186790518942408846178710373583**	0.218588360161304046262455466832795250429697582641401147406284… **0,21858836016130404626245546683279525042 97** **v_{rot}/c =0,21858836016130404626245546683279525042 97** **v_{rot} = 65531141,782946616514367237517103 m/s = 65531,1418 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =4075171,3865232153936722749349765 m/s** **v_{climb} =4075,1714 km/s** average **v_{transl} = v_{climb} sin** 45° =**2881,581 km/s**
	66°	**0,40673664307580020775398599 03415** **(cosφ)/ (2 π) =** **=0,064734147282117527129433089629846**	0.229944593319214769283095123057183521523081091270580895879991… **0,22994459331921476928309512305718352152 31** **v_{rot}/c =0,22994459331921476928309512305718352152 31** **v_{rot} =68935654,834977774313281984789071 m/s = 68935,6548 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =4462490,8330766684572208976359625 m/s** **v_{climb} =4462,4908 km/s** average **v_{transl} = v_{climb} sin** 45° =**3155,458 km/s**
fí = π/2.76923076923 =	**65°**	**0,42261826174069943618697 8**	

65°		**48964773** **(cosφ)/ (2 π) =** **=0,06726178539693674661119** **4276241963**	0.241577919126684096973848691726649936311538644581330743459550... **0,24157791912668409697384869 1** **v_{rot}/c =0,24157791912668409697384869 1** **v_{rot} = 72423238,173513838821300460794972 m/s** **v_{climb} = v_{rot} (cosφ)/(2 π) = 4871316,303778125060965200220647 8 m/s** **v_{climb} = 4871,316 km/s** average **v_{transl} = v_{climb} sin** 45° =**3444,54 km/s**
fí = π/ 2.8125 = 64°	**64°**	**0,438371146789077417452734** **54065827** **(cosφ)/ (2 π) =** **=0,069768934920344513122850071727462**	**0.25351000320414048106191792282324095356276696913755695906930 7** 0.25351000320414048106191792282324095356276696913755695906930 7... **0,25351000320414048106191792282 32** **v_{rot}/c = 0,25351000320414048106191792282 32** **v_{rot} =76000386,988157150594854824277361 m/s = 76000,387 km/s** **v_{climb} = v_{rot} (cosφ)/(2 π) = 5302466,053697734181244169499053 m/s** **v_{climb} =5302,466 km/s** average **v_{transl} = v_{climb} sin** 45° =**3749,41 km/s**
180/ 2,81690140845 = 63,90000000001°	**63,9°**	**0,439939169855915140833045** **76528102** **(cosφ)/ (2 π) =** **=0,070018493542313850183913679461913**	0.254720530502096569804559171822028443558904964570508421300898... **0,25472053050209656980455917182 2** **v_{rot}/c = 0,25472053050209656980455917182 2** **v_{rot} = 76363293,942287504815077373726962 m/s = 76363,294 km/s** **v_{climb} = v_{rot} (cosφ)/(2 π) = 5346842,803767872010449830294605 8 m/s** **v_{climb} = 5346,8428 km/s** average **v_{transl} = v_{climb} sin** 45° =**3780,789 km/s**
fí = π/3 = 60 stupňov	**60°**	**0,5** **(cosϕ)/ (2 π) =** **=0,079577471545947667884441881686257**	0.304728158522405804988532559989798534395286045112822783532734... **v_{rot}/c = 0,30472815852240580498853255998979853439528** **v_{rot} = 91355203,665245684350980837972135 m/s= 91355,204 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) = 7269816,120 m/s** **v_{climb} = 7269,816 km/s** average **v_{transl} = v_{climb} sin** 45° =**5140,536 km/s**
	59°	**0,515038074910054210081631** **93639814**	0.318551835664780456174193289801635673880790343754972419379154... **v_{rot}/c = 0,31855183566478045617419328980163567**

		$(\cos\varphi)/(2\pi) =$ **=0,081970855502469004760071096005015**	**v_{rot} = 95499437,814356596986822682516548 m/s = 95499,4378 km/s** **$v_{climb} = v_{rot}(\cos\phi)/(2\pi)$ = 7828170,6176476490036263375754919 m/s** **v_{climb} = 7828,1706 km/s** average **$v_{transl} = v_{climb}$ sin** 45° =**5535,35 km/s**
	58°	**0,5299192642332049540467811518160 9** **$(\cos\varphi)/(2\pi) =$** **=0,0843392703423347818857432790937773**	0.33285226024665909468501249678125364096754889562112004976886 7… **0,33285226024665909468501249678125364096 7** **v_{rot}/c =0,33285226024665909468501249678125364096 7** **v_{rot} = 99786597,250201616283674632170693 m/s = 99786,59725 km/s** **$v_{climb} = v_{rot}(\cos\phi)/(2\pi)$ =8415928,8020264346749535117691155 m/s** **v_{climb} =8415,9288 km/s** average **$v_{transl} = v_{climb}$ sin** 45° =**5950,96 km/s**
	57°	**0,5446390350150270822240836920815 7** **$(\cos\varphi)/(2\pi) =$** **=0,0866819946234414264103771079174454**	0.34767044361505302490694412921865133448801423600477009529775 0… **0,34767044361505302490694412921865133448 8** **v_{rot}/c = 0,34767044361505302490694412921865133448 8** **v_{rot} = 104228976,86530715213718800176693 m/s = 104228,9769 km/s** **$v_{climb} = v_{rot}(\cos\phi)/(2\pi)$ =9034775,6122453553799141044896179 m/s** **v_{climb} =9034,7756 km/s** average **$v_{transl} = v_{climb}$ sin** 45° =**6388,551 km/s**
	56°	**0,5591929034707468301604281399859 9** **$(\cos\varphi)/(2\pi) =$** **=0,0889983147292784335456349082046 38**	0.36305201598794154297664944307509105801151924521517709196338 5… **0,36305201598794154297664944307509105801 15** **v_{rot}/c =0,36305201598794154297664944307509105801 15** **v_{rot} = 108840256,2548802935292823731437 9 m/s = 108840,2563 km/s** **$v_{climb} = v_{rot}(\cos\phi)/(2\pi)$ =9686599,3813871519841958331379241 m/s** **v_{climb} =9686,5994 km/s** average **$v_{transl} = v_{climb}$ sin** 45° =**6849,460 km/s**
	55°	**0,5735764363510460961080319128261 6** **$(\cos\varphi)/(2\pi) =$** **=0,0912875250863028686240455084937706**	0.37904797824017707195845959221668624007880778219590636877804 4… **0,37904797824017707195845959221668624007 88** **v_{rot}/c = 0,37904797824017707195845959221668624007 88** **v_{rot} = 113635725,0965531987576694750441 1 m/s = 113635,7251 km/s**

			$v_{climb} = v_{rot}(\cos\phi)/(2\pi) = 10373524,10545181659942670296 3116$ m/s $v_{climb} = 10373,5241$ km/s average $v_{transl} = v_{climb} \sin 45° = 7335,189$ km/s
	54°	0,587785252292473129168705 95463907 $(\cos\varphi)/(2\pi) =$ $=0,0935489283788639033212919066 15298$	0.39571561175097860002972560945630230868207906537641736869049 0... 0,39571561175097860002972560945630230868 21 $v_{rot}/c = 0,39571561175097860002972560945630230868 21$ $v_{rot} = 118632555,9157995584083103135243 6$ m/s = 118632,5559 km/s $v_{climb} = v_{rot}(\cos\phi)/(2\pi) = 11097948,4767687001472120562626 24$ m/s $v_{climb} = 11097,9485$ km/s average $v_{transl} = v_{climb} \sin 45° = 7847,435$ km/s
	53°	0,601815023152048279917977 00044149 $(\cos\varphi)/(2\pi) =$ $=0,0957818357616119179469097066 55076$	0.41311958830428412725404202481871076471 0... 0,41311958830428412725404202481871076471 $v_{rot}/c = 0,41311958830428412725404202481871076471$ $v_{rot} = 123850136,8256893904398740490 5549$ m/s = 123850,1368 km/s $v_{climb} = v_{rot}(\cos\phi)/(2\pi) = 11862593,4644913452021630818 17685$ m/s $v_{climb} = 11862,5935$ km/s average $v_{transl} = v_{climb} \sin 45° = 8388,120$ km/s
	52°	0,615661475325658279668811 09284366 $(\cos\varphi)/(2\pi) =$ $=0,0979855670693274679331854021 76855$	0.43133333571250360043202348589008464286557341872782626687425 5... 0,43133333571250360043202348589008464286 $v_{rot}/c = 0,43133333571250360043202348589008464287$ $v_{rot} = 129310480,9305906357073661827 4869$ m/s = 129310,4809 km/s $v_{climb} = v_{rot}(\cos\phi)/(2\pi) = 12670560,8019913793048170262 33654$ m/s $v_{climb} = 12670,5608$ km/s average $v_{transl} = v_{climb} \sin 45° = 8959,439$ km/s
	51°	0,629320391049837452705902 45827997 $(\cos\varphi)/(2\pi) =$ $=0,1001594510241061985864031465 6053$	0.45044073388403495104272058533652259843418208447283296030076 1... 0,45044073388403495104272058533652259843 4 $v_{rot}/c = 0,45044073388403495104272058533652259843 4$ $v_{rot} = 135038734,7944187249310068672 8508$ m/s = 135038,7348 km/s $v_{climb} = v_{rot}(\cos\phi)/(2\pi) = 13525405,5439988479110205467 73589$ m/s

			v_{climb} =13525,4055 km/s average **v_{transl} = v_{climb} sin** 45° =**9563,906 km/s**
	50°	**0,642787609686539326322643 40990726** **(cosϕ)/ (2 π) = =0,102302825439836597568361 44428118**	0.4705382429822867842131634702436390595084619025854357004220 35… **0,4705382429822867842131634702436390595084619** **v =141063816,4466610055001798726999 6 m/s=141063,816 km/s** **v_{climb} = v_{rot} (cosϕ)/ (2 π) =14431226,98982 m/s** **v_{climb} = 14431,227 km/s** average **v_{transl} = v_{climb} sin** 45° =**10204,418 km/s**
	49°	**0,656059028990507284782495 96402342** **(cosφ)/(2 π) = =0,104415037423908299203933426511 64**	0.4917376040140225029097151774079206632449069402622481170110 60… **0,4917376040140225029097151774079206632449069 40** **v_{rot}/c = 0,4917376040140225029097151774079206632449069 40** **v_{rot} = 147419224,99839447261461566511475 m/s = 147419,2250 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =15392783,89521091673768196771840 8 m/s** **v_{climb} =15392,7839 km/s** average **v_{transl} = v_{climb} sin** 45° =**10884,342 km/s**
	48°	**0,669130606358858213826273 33068678** **(cosφ)/(2 π) = =0,106495443576089498311186408 42987**	0.5141693087867580380630799985238982229043569943793194105441 04… **0,5141693087867580380630799985238982229043 57** **v_{rot}/c =0,5141693087867580380630799985238982229043 57** **v_{rot} = 154144080,90934319008218831180785 m/s =154144,0809 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =16415642,27106913210553829547846 3 m/s** **v_{climb} =16415,6423 km/s** average **v_{transl} = v_{climb} sin** 45° =**11607,612 km/s**
	47°	**0,681998360062498500442225 78471113** **(cosφ)/(2 π) = =0,108543410184512893567239305892 7**	0.5379871206505973737325190876301342741365766927664035618795 64… **0,5379871206505973737325190876301342741365 767** **v_{rot}/c = 0,5379871206505973737325190876301342741365 767** **v_{rot} = 161284481,27218514583961653181252 m/s = 161284,4813 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =17506367,60712318020780139035389 6 m/s** **v_{climb} =17506,3676 km/s** average **v_{transl} = v_{climb} sin** 45° =**12378,871 km/s**

	46°	**0,6946583704589972866564062994226 9** **(cosφ)/(2 π) =** **=0,1105583134187104611929502067275 7**	0.5633740563508707136181207372760899532944182495565002744427 9... **0,5633740563508707136181207372760899532944182** **v_{rot}/c = 0,5633740563508707136181207372760899532944182** **v_{rot} = 168895293,12685804167579048916874 m/s = 168895,2931 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =18672778,75246414615662433325970 5 m/s** **v_{climb} =18672,77875 km/s** average **v_{transl} = v_{climb} sin** 45° =**13203,648 km/s**
	45°	**0,7071067811865475244008443621048 5** **(cosφ)/(2 π) =** **=0,1125395395196382586943998988758 4**	0.5905504410053431398576167458592401424491754298647259112114 94... **0,5905504410053431398576167458592401424491754** **v_{rot}/c = 0,5905504410053431398576167458592401424491754** **v_{rot} = 177042568,2819758110313526942630 3 m/s = 177042,5683 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =19924289,10982767167944985151295 9 m/s** **v_{climb} =19924,2891 km/s** average **v_{transl} = v_{climb} sin** 45° =**14088,600 km/s**
	44°	**0,7193398003386511393560546744567 1** **(cosφ)/(2 π) =** **=0,1144864849866333752651400911453 1**	0.6197849727861213103167083421650774529216017432977111163266 78... **0,6197849727861213103167083421650774529216017** **v_{rot}/c = 0,6197849727861213103167083421650774529216017** **v_{rot} = 185806860,42301441590602675236675 m/s = 185806,8604 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =21272374,33623292300497216603540 2 m/s** **v_{climb} =21272,3743 km/s** average **v_{transl} = v_{climb} sin** 45° =**15041,84 km/s**
	43°	**0,7313537016191704832875436082756 2** **(cosφ)/(2 π) =** **=0,1163985567612460799510211560263 1**	0.6514102732354645321549143582667817521784050015711865839005 34... **0,6514102732354645321549143582667817521784050** **v_{rot}/c = 0,6514102732354645321549143582667817521784050** **v_{rot} = 195287886,97971152486654181224406 m/s =195287,8870 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =22731228,19739176121624702254797 1 m/s** **v_{climb} =22731,2282 km/s** average **v_{transl} = v_{climb} sin** 45° =**16073,406 km/s**
	42°	**0,7431448254773942350146970489742 6**	0.6858453291367208275362749170445488953769482832011773841156 02...

		(cosφ)/(2 π) = =0,11827517240789117052444638128938	**0,685845329136720827536274917044548895376948 3** **v_{rot}/c = 0,685845329136720827536274917044548895376948 3** **v_{rot} =205611257,0297165549468939415443 7 m/s = 205611,2570 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =24318706,87419295095044522186916 3 m/s** **v_{climb} =24318,7069 km/s** average **v_{transl} = v_{climb} sin** 45° =**17195,923 km/s**
	41°	**0,754709580222771997942984 21956102** **(cosφ)/(2 π) = =0,120115760291263494917176720388 7**	0.72362890589612711462294394509955934716795165400369506091842 7… **0,723628905896127114622943945099559347167951 65** **v_{rot}/c = 0,723628905896127114622943945099559347167951 65** **v_{rot} = 216938488,378450640373260108497 45 m/s =216938,4884 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =26057731,4680150285980776807285 3 m/s** **v_{climb} =26057,7315 km/s** average **v_{transl} = v_{climb} sin** 45° =**18425,599 km/s**
	40°	**0,766044443118978035202392 65055542** **(cosϕ)/ (2 π) = =0,121919759750463602725194 86150119**	0.765471182644718647941843491555499291792214259709542355577987… **v_{rot}/c =0,765471182644718647941843491555499291 79** **v =229482487,37322714418492190138458 m/s=229482,487 km/s** **v_{climb} = v_{rot} (cosϕ)/ (2 π) =27978449,727482650 m/s** **v_{climb} = 27978,4497 km/s** average **v_{transl} = v_{climb} sin** 45° =**19783,752 km/s**
	39°	**0,777145961456970879979937 7436724** **(cosφ)/ (2 π) = =0,123686621269780486425387 17137345**	0.8123372402479625775004382310771546647618824377090822239483 85… **v_{rot}/c = 0,8123372402479625775004382310771546647 6** **v_{rot} =243532577,9788732306008718733717 5 m/s=243532,577 km/s** **v_{climb} = v_{rot} (cosϕ)/(2 π) =30121721,7393 m/s** **v_{climb} =30121,722 km/s** average **v_{transl} = v_{climb} sin** 45° =**21299,274 km/s**
	38°	**0,788010753606721956693977 78783585** **(cosφ)/(2 π) = =0,125415806646079390226 65**	0.865589873165299252596244857083262245043548736323475707999352… **0,865589873165299252596244857083262 2** **v_{rot}/c = 0,865589873165299252596244857083262 2** **v_{rot} = 259497315,69613330324139112727477 m/s =259497,316 km/s**

		934953968	$v_{climb} = v_{rot} (\cos\varphi)/(2\pi) = 32545065,17052287679987420348826 6$ m/s $v_{climb} = 32545,065$ km/s average $v_{transl} = v_{climb} \sin 45° = 23012,836$ km/s
	37°	**0,7986355100472928462840008040689 4** $(\cos\varphi)/(2\pi) =$ **=0,1271067891527436986073876282640 1**	0.92725217678729780906036172010142033242791743737739330337323 7... **0,92725217678729780906036172 0** $v_{rot}/c = 0,92725217678729780906036172 0$ $v_{rot} = 277983209,2649145533562205104079 1$ m/s $=277983,209$ km/s $v_{climb} = v_{rot} (\cos\varphi)/(2\pi) = 35333553,16803852277035283496016 9$ m/s $v_{climb} = 35333,55$ km/s average $v_{transl} = v_{climb} \sin 45° = 24984,593$ km/s
	36°	**0,8090169943749474241022934171828 2** $(\cos\varphi)/(2\pi) =$ **=0,1287590537001209662518162753936**	1.00053925634226179717758724686371736681367122473731836631710 2... $v_{rot}/c = 1,00053925634226179717758724686 37$ $v_{rot} = 299954122,98433875345536634324651$ m/s = 299954,123 km/s $v_{climb} = v_{rot} (\cos\varphi)/(2\pi) = 38621809,02921186445564149989448 6$ m/s $v_{climb} = 38621,809$ km/s average $v_{transl} = v_{climb} \sin 45° = 27309,743$ km/s
	35°	**0,8191520442889917896844883859168 4** $(\cos\varphi)/(2\pi) =$ **=0,1303720969924242159704071809571 4**	1.09109242326913724447172866372844892311812702088707430369594 5... $v_{rot}/c = 1,09109242326913724447172866372 8448923118$ $v_{rot} = 327101279,4770310500595264476080 7$ m/s $=327101,279$ km/s $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 42644879,734326$ m/s $v_{climb} = 42644,8797$ km/s average $v_{transl} = v_{climb} \sin 45° = 30154,4834$ km/s
	32,123°	**0,8469085360725270337246126886004** $(\cos\varphi)/(2\pi) =$ **=0,1347896798626634282063184886597**	$v_{rot}/c = 1,89550406058$ $v_{rot} = 568257821,47025910564$ m/s = 568257,8215 km/s $v_{climb} = v_{rot} (\cos\varphi)/(2\pi) = 76595289,835430773270630504574016$ m/s $v_{climb} = 76595,2898$ km/s average $v_{transl} = v_{climb} \sin 45° = 54161,0488$ km/s

The proposed views

In short, when four protons fuse to become one helium nucleus, two of which must be converted into neutrons, and each such transition depends on the penetration of the two electrons from the Universe, to the interior of the star .

Penetration 10^{38} to 10^{58} of high energy electrons from the Universe to the interior of the star, transferred huge amounts of energy from the Universe into a small space of the star.(Also at the beginning of ignition stars in the nebulae too ... there where stars are born).

This huge cosmic energy is responsible for thermonuclear fusion.

Currently prevailing opinion that the star itself is the source of the nuclear fusion powering the star.

In fact, without a high-energy electrons from other stars of the Universe, single star can not be able to a nuclear fusion, because without a high-energy electrons from other stars, her stellar protons cannot be transform into her neutrons.

The idea that inside the star, the mass converted to energy and energy into mass, without regard to high-energy electrons from the surrounding Universe, so finally falls. It is unsustainable.

Neutronization, i.e. injection of free electrons to protons to form neutrons and neutrinos, as a consequence of the Pauli principle can therefore simply replace with the above considerations. Although the inverse beta-decay is common to both considerations, the qualitative difference is obvious.

The free electrons in the stars are replaced by high-energy electrons from the Universe and neutrinos are replaced by waves which spread in the opposite direction to the movement of high-energy electrons from the Universe, i.e.

by kinetic energy (of wave = of neutrinos) = $Ew = mc^2 [\ln | 1 + v / c | - (v / c) / (1 + v / c)]$ against direction of motion of electron (from the interior of the star, to the Universe), where **v** is velocity of electron.

Moreover, formation of a supernova is only possible, if the increase the number of penetrating high-energy electrons from the Universe.

At the end of life star :

1. high-energy electrons from the Universe are penetrating into the star,

2. by waves (= by electron neutrinos) propagated from inside of star to her surface , the star expands, more and more. More and more active are mutual repellent protons of star. In combination with neutrino waves, star more and more expands.

Gradually grows, its radius will expand about 100 times ($R_{RG} = 100\ R_S$ … Arcturus) and due to conservation of angular momentum

(L = I* ω = const) decreases rotation of the magnified star from $\omega_s = 2{,}8 * 10^{-6}$ Hz on $\omega_{RG} = 10^{-8}$ Hz. This creates a Red Giant.

This makes that the high-energy electrons from the Universe easily penetrate into the interior of stars (electrons have a small radius of force reach $\mathbf{r_e}$ =2,840401487397554751560630135382e-24 m in direction of motion from the Universe) and in particular the impact of 10^6 times more (since the volume of Red Giant is a $100^3 = 10^6$ times greater).

Therefore into the interior of Red Giant can easily penetrate slower electrons from the universe too. Total number all electrons from the Universe is approximately 10^7 times more than in the middle of life stars. As a result, inside the Red Giant arises approximately 10^7 times more neutrons per second.

After some time, almost all protons inside the Red Giant will turn into neutrons (repulsive force of protons is replaced without force, or a weak attractive force of neutrons respectivelly).

After the conversion of protons into neutrons, leads to of neutrons concentration and a very dense neutron star with a radius of R_{ns} = 10 000 km, and due to conservation of angular momentum,

neutron star spinning at ω_{ns} = 1 Hz to 716 Hz .[17]

Together with this reduction of the Red Giant in neutron star, arises emission neutrino waves in the opposite direction of movement of electrons from the Universe.

This creates a shock wave which ejects the remnants of star into Universe - thus creating a circular cloud of gas that is growing with time after the supernova explosion.

The remaining protons, which did not create with electrons from the Universe neutrons,

create hydrogen atoms - electron capture (K-capture).

And either because some electrons from the Universe have a lower speed of 0,003 c – 0,6c or because they are located in areas distant from the center of the star where the pressure is significantly lower. These hydrogen atoms are entrained by the neutrino waves propagating from inside of the star out into Universe.[16]

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