Dark Matter and Other Astrophysical Problems of Alien Civilisations

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SUMMARY.

Two foreign civilisations ask for help on behalf of astrophysical problems. The most urgent problem is called “the missing mass problem“. We should be able to help them.

INTRODUCTION.

Any alien civilisation is orbiting a gravitational centre, like the Earth and the solar system are orbiting the very centre of the Milky Way. And there are 4 other objects, also orbiting the centre in the same orbiting plane. None of these 4 objects is located upon the connecting line between the civilisation and the centre. The scientists of this civilisation are able to measure the total gravitation that pulls their home planet towards the centre. The total local gravitation is deriving both from the gravitational centre as well as from these 4 objects. The scientists know exactly the mass of each object and also position and distance.
And they believe in a rule that means all objects in symmetrical distribution will exert gravitation on an external position as if all objects were concentrated in the very centre.
Calculating the gravitation by using this rule, and comparing the result with the exact measuring of gravitation, there is a surprising difference: there is too little measured gravitation! There should be more gravitation according to the calculation rule.
And the scientists of this strange civilisation ask themselves and us, if there might be some further objects, built of a strange kind of matter, exerting some kind of negative gravitation. Nobody can see these objects. Obviously this matter is invisible, not interacting with light or objects of normal matter but by negative gravitation. - But does this matter really exist?

Imagine there is another civilisation, orbiting another gravitational centre. Other orbiting objects are also symmetrically distributed. In contrary to the problem of the first civilisation, one of these objects is located upon the very connecting line to the centre.
Using the same rule and exact observations, the result of the calculations is contrary to that of the first civilisation: there is too much gravitation! There should be less gravitation than measured.
So the most capable brains of their scientific community arrive at the conviction that there must be another kind of matter exerting additional gravitation by additional mass. But this mysterious matter, obviously unvisible and not interacting with light or normal matter but by gravitation, cannot be found in spite of all efforts. They call it the “missing mass problem“.

Are we able to help the aliens?

CALCULATIONS. GEOMETRIC FACTS.

Let's calculate the imaginary simulation.
These are the coordinates of the first civilisation, let's call it civilisation A.
The gravitational centre C is located at position 0/0 .
The planetary system of the civilisation A is at 0/-16, the line A to C is called the distance of R.
The first of four further orbiting objects is located at 8/-8.
The second object is at the position symmetrically beyond the centre at -8/8.
And the two other symmetrical positions are at -8/-8 and 8/8.

The gravitation force of one standard mass at the distance of R is 1, they call it **1 galactic gravitation unit or 1ggu** or $1/R^2$. So four standard masses at the distance of 1R will exert 4 ggu or $4/R^2$, simplified.
According to the rule mentioned above, our aliens expect that 4 standard masses in symmetrical distribution orbiting the centre C will exert the local gravitation force of 4 ggu at the position of A.
They are able to observe the local gravitation at position 0/-16 as the sum of all gravitational forces into the direction of the centre. And they know the local gravitation of the centre at this position calling it GC, and they know that each orbiting object has got one standard unit of mass.

We are searching for the force of the first orbiting object at position 8/-8 .
First of all we recognize that the object at position 8/-8 will exert gravitation force upon position A not directly towards the centre but at an angle of 45°. That means, building a rectangle of forces, gravitation will pull partially towards the centre and partially towards sideways. So gravitation force is splitted up by vectors into different directions. We have to calculate the vector towards the centre corresponding to the cosinus.
The total gravitation force of the object 8/-8 upon A will be 1 **mass divided by the square of distance**. The distance we get from the theorem of Pythagoras as the root of $(2R^2/4)$ or R/root of 2.
Therefore the gravitation upon A will be $2/R^2$ oder 2 ggu into the direction of position 8/-8.
To get the partial gravitational force towards the centre, we are searching for the effective mass upon the connecting line from A to C, exerting exactly the same gravitation towards the centre as the object at position 8/-8. We get it by the cosinus, that's adjecent divided by hypotenuse:
R/2 divided by root of $(2R^2/4)$. The effective mass upon the connecting line therefore will be 1.4142/ 2 = 0.7071. The force towards the centre will be 0.7071 * 2 ggu = 1.4142 ggu .
The same force towards the centre will be effected by the position -8/-8, so we get for the two **positions 8/-8 and -8/-8 a single force of** 2 * 1.4142 = **2.8284 ggu** effecting upon position A towards the centre. (The both vectors to sideways of both objects will vanish by subtraction.)

The two orbiting objects at distant positions will exert less gravitation upon A than the both near objects, because of Newton's square rule of gravitation which is in force all over the universe.
The distance from A to the position 8/8 we get, corresponding again to the theorem of Pythagoras, as the root of $(3^2R^2/2^2 + R^2/2^2)$ or root of $(10R^2/4)$ or 0.5R * root of 10 or 3.1623R/2 or 1.5811R. So we calculate mass divided by square of distance and we get $1/5R^2/2$ or 0.4 ggu.
The effective mass towards the centre we get also by cosinus:
1.5 R divided by 1.5811 R is 0.9487
So the gravitational vector towards the centre is 0.9487 * 0.4 ggu is 0.3795 ggu.
For both **distant positions** we get a single force of 2 * 0.3795 ggu or **0.759 ggu.**

The single gravitational force of the four positions on A at 0/-16, or the local gravitation towards the centre, therefore will be 2.8284 + 0.759 = **3.5874 ggu.** That's the result of **vector calculation.**

The aliens are **observing** the local gravitation at the position A and get **3.5874 ggu.** (Strictly speaking the local gravitation of the centre GC plus 3.5874 ggu.)
So they are able to calculate the difference between the **expected result of 4 ggu** and the observed result of 3.5874 ggu, and they get a **difference of 0.4126 ggu**.
And all over their planet the only reasonable idea to explain this difference seems to postulate a strange kind of new matter, the main feature of which is negative gravitation. The exact result of these considerations is that there must be 0.4126 ggu of negative gravitation to compensate the difference. This is corresponding to 0.4126 units of matter within the very centre or symmetrically distributed respectively. (They have got good reasons to believe that negative matter must be symmetrically distributed within a global halo around the centre.)

Civilisation B reports the following coordinates:
The centre also at 0/0 .
Position B at -16/0 .
The four further orbiting objects have got the positions of -8/0, 0/8, 8/0 and -8/0 .

The aliens do expect four standard masses united in the very centre exerting gravitation of 4 ggu. The same result is expected when objects are distributed in a symmetrical way.

Let's calculate for each orbiting object the local gravitation on B taking into consideration vector effects.
Position -8/0 at the distance of **R/2 will exert gravitation of 4 ggu** according to Newton's gravitation law. (Obviously the addition of 4 ggu and three further gravitational effects of more than 0 ggu will result in more than 4 ggu.)

The distant position of 8/0 at a distance of 3R/2 will exert gravitation of 4/9 or 0.4444 ggu upon B.

Each of the lateral positions will exert **gravitation proportional to the effective mass by cosinus, and inversely proportional to the square of distance.**
The distance we get by root of ($R^2 + R^2/4$). Or R * root of 5/4. That's 1.1180R .
We get the cosinus by R/ root of ($R^2 + R^2/4$). Or 1/ root of 5/4. That's 0.8945.
So the local gravitation will be $0.8945/ 1.250R^2 = 0.7156$ ggu.

The addition of the local gravitation of these four orbiting objects results in
4.0000 ggu + 0.4444 ggu + 0.7156 ggu + 0.7156 ggu = 5.8756 ggu .
Again the result of vector calculation is exactly congruent with the amount of local gravitation observed by the aliens.

But the most capable brains of civilisation B do agree that logically there can be only 4.0000 ggu. So they are able to calculate very exactly the difference between the gravitation expected and observed: there is too much local gravitation at an amount of **1.8756 ggu**. The additional gravitation seems to be caused by any missing mass, that's the so-called **"missing mass problem"**.
In their brains it is reasonable to accept that the only possible explanation is: there must be a strange kind of matter causing additional gravitation. The main features of this matter are being invisible and not interacting with electromagnetic waves, only interacting with other masses by gravitation.

They call it The Dark Matter.

DISCUSSION. PARADIGM.

The correct calculation, using vector effects, obviously results in amounts that are identical with the most exact observations of the local gravitation.

Why the elite group of alien scholars cannot recognize this?

Any object all over the universe will exert gravitation starting from its very position.
Each day position-referred vector effects of gravitation are proved by the Sun and the Moon on behalf of the tides on Earth.
Whenever several masses will interact by gravity you will find vector effects being at work.
No matter if there are 4 objects or 4 billion objects.
No matter if these objects are distributed randomly or in a point symmetric or spherically symmetric way, no matter if they are distributed in the shape of a disk or like a spiral galaxy or even like a perfect globe. [1]
Therefore also by combining the objects of A and B or by combining any number of symmetrically distributed objects whatever, you won't get the same result of gravitation as if all objects were concentrated in the very centre. [2]

It seems the aliens are adoring a venerable scientist who had established a rule that means any objects at symmetric distribution will exert gravitation of the same amount as if all objects were concentrated in the symmetric point. So the alien scientists have got a severe paradigm which is hard to argue against. The members of the scientific community usually despise each one who dares to ask critical questions or to make alternative proposals. They think they have got convincing proofs. One current proof goes like that: Putting all mass into the centre, you will get mass divided by square of distance, that's it!

So perhaps, despite the utmost politeness and maximum diplomacy and despite undisprovable arguments, the mission to argue against the paradigm will be impossible.

On the other side the aliens are kind of desperate about this problem and they think about digging a huge hole in their planet for colliding matter at high speed, hoping this way to find the missing mass...

We should try to help them. Who is going to tell our alien friends that the “missing mass“ is nothing but a geometrical misunderstanding?

REFERENCES.

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