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Can there be more than one truth?

Until not long ago it was assumed that the planet Mercury along its revolution was showing always its face to the Sun, once this was disproved it was realized that the earlier observations were correct but the astronomers of the past which sought in conditions of illumination always the same face of Mercury in the same spot in recurrent conditions, had made that assumption by analogy with the case Earth-Moon in which the moon shows always the same face.

As it is reported in the Wikipedia, under the article regarding the planet "Mercury", the puzzle was solved by the NASA scientist "Bepi Colombo" with the hypothesis now accepted that the rotation of Mercury around its axis was in resonance with the time of revolution.

This classic case shows that honest scientists along the path of research can claim to have found a *truth* whereas they have found *only part of it*.

I want now to offer to the attention of the readers what I think is a similar case regarding the phenomenon of precession affecting Mercury.

In my search for knowledge I was never convinced that the secret of the precession could be unraveled through the rotation at the perihelion of an eccentric orbit, my intuition told me that a precessional phenomenon, definitely should have been strongly present also over masses in circular orbits (with eccentricities close to zero).

To my perception a gravitational mass should be subjected to precession even when the orbits had such a small eccentricities to be considered circular, (I mean that *precession between planets does not depends from the shape of the orbit, "provided the eccentricities are not excessive" (assuming then that Mercury's eccentricity $\varepsilon = .204$ is not excessive)*).

Under these assumptions for all the planets of the solar system including Mercury we should be able to calculate the Newtonian precession, due to gravitational induction, using formulations approximating their orbits to a circle.

In any case Le Verrier determined the position of Neptune with the help of Newton's Universal Law of Gravity which in the case Uranus-Neptune had to be perturbation of the orbital path (assumed circular) of the planet Uranus hinting the presence of Neptune which at the time hadn't been discovered and this is far from considering an eccentric orbit rotating against its perihelion.

His suspicions in regard of the existence of Neptune were, by necessity, based only over observations of deviations from Newton's Law (orbital swaying of

gravitational origin measurable when the distances were minimal) affecting Uranus when the other two major planets (were not around) and he must have based his calculations purely in regard of a presumed passage over a supposed circular orbit of an unknown body also in circular orbit (Neptune) causing variation of the approximate circular orbital path of the known body (Uranus).

I figure out that he possibly went this way, since observation of a similar phenomenon were available at the time in regard of the gravitational effects exchanged between the major satellites Jupiter Saturn or of Uranus.

Note: Presently what I mention above must be considered pure speculation since I haven't investigated enough the very advanced and sophisticated lines of thought followed by Le Verrier and according to the historical facts by his less successful colleague Adams.

I am far from rekindling the whole saga attending the discovery of Neptune, my only interest rests on the fact that when (after the discovery of Neptune) the next step of research concentrated attention on Mercury, (according to Le Verrier) the discrepancy of observations between calculated gravitational precessions and observations brought out an unexplainable difference between readings and calculations of 38" arcs/century.

It is now on these 38" arcs/century (successively corrected into ~43") that I concentrate my attention and as we all know also the explanation of their existence made by Einstein was based on formulations taking into account the eccentricity of Mercury.

I do not dispute the fact that *the calculations of the precession of Mercury* caused by the gravitational effects inflicted on it by the other planets of the solar system and **based over its eccentricity can give true results**, I just want to point that through this choice the discussion about precessions is hitting a dead alley, since being the orbits of the other planets nearly circular, no further attempt can be made to calculate precessions through the eccentric orbital path of a planet, (other than Mercury) and everybody keeps hush in regard of Le Verrier and its calculations of gravitational precessions of Mercury which if he followed his precedent line of thought had to be based on circular paths and pure gravitational Newtonian interactions (since this was the successful line he had followed when Neptune was discovered).

The whole question revolves now around the observation that the orbit of **Mercury owes its eccentricity to a gravitational resonance due to the presence of the other planets and to the smallness of Mercury in their respect**, and since the eccentric orbit depends from their gravitational presence also the precession can be tied up to values proportional to their gravitational action over the orbit, this result nevertheless has the limitation that cannot be generalized and extended to the other planets (*is a local result based on the Universal Law of Gravity which has a local effect magnified by the small size of Mercury and cannot be universally extended*).

In the other hand calculations of precessions made approximating the orbits to perfect circular paths and weighing the effects of passages of the planets over the orbits are the answer since they can be universally extended.

Once determined the **general formulation of precession** we can have the Newtonian precession afflicting any individual planet due to the influence of one of the surrounding others or, summing the effects, we can have the total precession of that individual planet due to the presence of all the others and, reasoning along this path, we can even determine the precession of a man made satellite of Earth caused by the presence of the Moon etc....

One can ask now: "is there going to be a remainder like in the case of Mercury?" and the answer is undoubtedly affirmative since the "relativistic precession" tied up to the "unbundling" is also a gravitational phenomenon generally (universally) valid.

What is not readily acceptable is the intuition that we from Earth, although subjected to these precessional influences and to the relativistic precession are unable to measure these effects (on Earth) through the use of our clock, but then we must realize that with our clock we are only measuring the local absolute Newton time over an orbital path assumed circular, (and whatever are the local discrepancies of gravitational nature that act over the orbital path, they cannot affect a clock whose physical working follows them as well).

A simple formulation having pure Newtonian looks and *based on the simple concepts developed through the UDS* gives a total value of gravitational precession caused by the presence of the planets of the solar system over Mercury of $\cong 536.5''$ arcs/century (using astronomic values from old text books which probably were the same used by Le Verrier) and a discrepancy (remainder) of $\cong 38''$ arcs/century (exactly coinciding with his results).

Nevertheless when I used more advanced (updated) values for orbital radiuses and masses *with the use of the same formulations* I obtained a gravitational precession of $531.26''$ arcs/century and a remainder of $43.24''$ arcs/century which is consistent with a calculated value of $43.04''$ arcs/century (a relativistic value of precession obtained through concepts associated to the UDS).

Below I report the sum of the gravitational precessions inflicted by the main players of the solar system over each other as they should be observed from us on Earth.

These are sums calculated over one century time, (and in the table is also shown the relativistic precession) but due to the near circular orbit of all the planets (with the exception of Mercury) I doubt that at present status of knowledge it will be possible to make many meaningful observations (from Earth).

Note: it is to be noted that the measure of precession on Earth is beset by the extra value of precession due to the change of orientation of the terrestrial axe over a century (not shown here).

Note: calculations show that (excluding the effects, not shown here, due to Neptune) the precession of Jupiter is mainly (0.988%) due to Saturn, and the

precession of Saturn is mainly (0.996%) due to Jupiter, and these calculations expanded to Neptune have little meaning, confirming that the calculations regarding its discovery were based on local perturbations measured over Uranus orbit over a relatively short period of time whilst Neptune was on alignment with Uranus.

Note: since this short article is based on formulations for which, if applicable, I would like to obtain undisputed priority, for the time being, I leave to the reader the option to accept the results shown here.

Table of precessions of planets, up to Uranus, as they should be observed from Earth

Planet	Calculated Precession due to the effect of the other planets in arcsec/century	Calculated relativistic Precession over 1 century	Precession measured over 1 century.
Mercury	531.26"	43.04"	574.5"
Venus	1589.05"	9.09"	N/A
Earth	1767.50"	4.00"	N/A
Mars	1816.00"	1.40"	N/A
Jupiter	991.50"	0.06"	N/A
Saturn	4705.80"	0.01"	N/A
Uranus	325.19"	-	N/A