On the wave mechanics of galaxies

Brent Jarvis
JarvisB@my.erau.edu

Abstract

The consistency in stellar orbital speeds, independent from their distance from galactic nuclei, is shown to be associated with an increase in their angular frequencies.

1. Introduction

The standard gravitational parameter μ for a circular orbit can be determined by

$$[1]\ \mu = G(M + m) = rv^2 = r^3 n^2,$$

where G is the gravitational constant, M is the mass of a primary, m is the mass of a secondary, r is the radius of the orbit, v is the secondary's velocity, and n is its mean motion,

$$[2]\ n = \frac{2\pi}{T}$$

where T is a secondary's period. Setting M to $M_\odot$ (one solar mass) and r to an astronomical unit (AU),

$$[3]\ G = \frac{n^2}{(M_\odot + m)}.$$

What does this tell us about the gravitational constant? When $M_\odot >> m$, as in the case with the bodies in our solar system, the gravitational constant $G \approx n^2$. This can also be shown with the Gaussian gravitational constant

$$[4]\ k = \frac{2\pi}{T\sqrt{M_\odot + m}} \approx n \approx \sqrt{G}.$$

Setting G to unity results in T = 2π, and when T is set to a sidereal year, k ≈ 2π.

2. The Sun's mean motion

According to geological evidence[1], the Sun oscillates perpendicular to the galactic plane in 33±1 Myr cycles during its estimated 225−250 Myr revolution period (the duration of its nodal (draconic) period is significantly less than its sidereal period). The Sun's angular frequency ω is therefore

$$[5]\ \omega \approx \frac{2\pi}{66\pm2\ \text{Myr}},$$

(33±1 Myr is half of the Sun's nodal period). Revisiting [4], T = 2π when G is set to unity, i.e. T = 1 cycle. A wave mechanical version of [1] will be hypothesized as,

$$[6]\ \omega^2 \sum_{i=1}^{n} (\gamma M_{0i} + \gamma m_0) = r^3 (Nn)^2,$$

where γM_0 is the relativistic mass interior to a secondary's orbit, γm_0 is the secondary's relativistic mass, and N is the secondary's wave quantity (the ratio between its revolution and nodal periods respectively). According to the estimates given previously, the Sun's wave quantity N ≈ 3.7. Note, however, that the nodal period was chosen arbitrarily since it can be deduced from physical evidence[1].

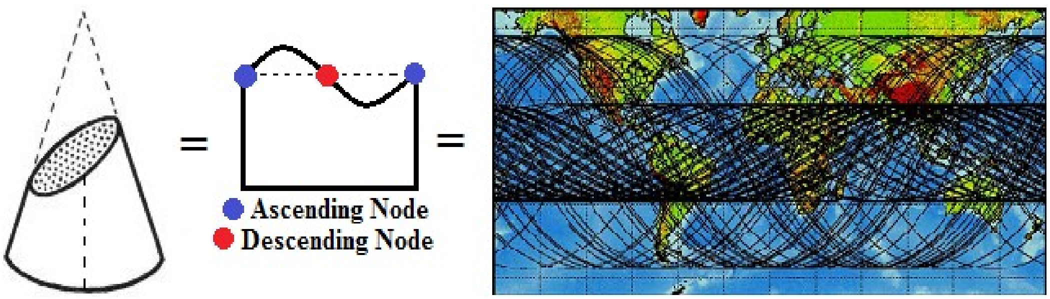

FIG. 1: An elliptical conic section is a sinusoidal wave with N ≈ 1:1 relative to a 2D plane of reference.

3. Conclusion

It is hypothesized that stellar positions will be observed to change helically over time by

$$[7]\ \vec{r}(t_1, t_2) = (r_1 + r_2 \cos(t_2)) \cos(t_1) x + (r_1 + r_2 \cos(t_2)) \sin(t_1) y + r_2 \sin(t_2) z,$$

where t_1 and t_2 are temporal dimensions relative to a star's revolution and nodal periods respectively, r_1 is a star's radius, r_2 is its amplitude, $t_1 \in (0, T_R)$, and $t_2 \in (0, T_N)$, where T_R and T_N are the revolution and nodal periods respectively set to 2π. An intuitive analog for [7] is a smoke ring, which requires two orthogonal temporal dimensions in order to parameterize its motion. Notice that the spacetime dimensions in [7] also match the spacetime dimensions of the gravitational constant (three spatial and two temporal), whereas Kepler's parametric equations are three dimensional (two spatial and one temporal). The temporal dimension $t_2 = it_1$ (i.e. it is orthogonal to t_1) and ($0 \le t_2 \le T_R$) for a bound orbit.

Reference

[1] M.R. Rampino and R.B. Stothers (1984). "*Terrestrial mass extinctions, cometary impacts, and the Sun's motion perpendicular to the galactic plane*," Nature 308, 709 – 712.