19(1): Application of n Theory to the S2 Orbit.

On 18th May 2018 the S2 star made a closest approach to the central mass. At closest approach:

$$r = 1.7952 \times 10^{13}\ m$$
$$v = 7.650 \times 10^{6}\ ms^{-1}$$
$$a = 1.651 \times 10^{14}\ m$$
$$M = 8.572 \times 10^{36}\ kgm$$
$$G = 6.67408 \times 10^{-11}\ m^3 s^{-2} kgm^{-1}$$

For a Newtonian orbit:

$$v^2 = MG\left(\frac{2}{r} - \frac{1}{a}\right) \quad -(1)$$

Using the above data it is found that

$$v^2 = 5.852 \times 10^{13}\ m^2 s^{-2} \quad -(2)$$
$$MG\left(\frac{2}{r} - \frac{1}{a}\right) = 5.977 \times 10^{13}\ m^2 s^{-2} \quad -(3)$$

The difference between equations (2) and (3) is explained by Eq. (54) of Note 417(7):

$$v^2 = n(r)^{3/2} MG\left(\frac{2m(r)^{1/2}}{r} - \frac{1}{a}\right) \quad -(4)$$

As in NFT417, Eq. (4) can be solved for $n(r)$ in terms of m, G, r, v and a.

In the first approximation the orbit is Newtonian, an ellipse that does not precess. So:

$$\Delta\phi = 0 \pm \text{unknown uncertainty} \quad -(5)$$

However, Einstein general relativity (EFR) gives a precession per S2 orbit of:

$$\Delta\phi = \frac{6\pi M G}{a(1-\epsilon^2)c^2} \quad -(6)$$

$$= 0.218^\circ \text{ per S2 orbit}$$

Here we have used:

$$\epsilon = 0.88466 \quad -(7)$$

and the orbital time:

$$T = 16.0518 \text{ earth years} \quad -(8)$$

Therefore the precession per earth year is:

$$\Delta\phi = \frac{0.218}{16.0518} = 0.0136^\circ \quad -(9)$$

$$= 0.0136 \times 3{,}600 \text{ "}$$

$$= 48.96 \text{ " per earth year}$$

$$= 4{,}896 \text{ " per earth century}$$

This compares with the famous Mercury precession of

$$\Delta\phi = 43.11 \text{ " per earth century} \quad -(10)$$

According to EGR dogmatists therefore the observed precession of the S2 star should be:

$$\Delta\phi = +4{,}896 \text{ " per earth century} \quad -(11)$$

because the dogmatists claim that EGR is always very accurate. However the data is 25% (2) and (3) slow but the orbit is nearly Newtonian, so EGR fails completely. The claimed precession of 4,896 " per earth century is never seen observed.

The main theory of Eq. (4) can be used to describe the orbit of S2 exactly if term $n(r)$

) In:
D. Borka et al., "Constraints on R^n gravity from Precession of Orbits of S2 Like Stars", the R^n Gravity theory produces a precession of -1° per S2 orbit, and the Yukawa theory of gravity produces 2° per S2 orbit. This converts to a Keplerian precession of $-22,459''$ per century for the R^n theory and $+44,917''$ per century for Yukawa gravitation. These two values are much larger in magnitude than Einsteinian general relativity.

Clearly there can be no confidence in claim that EGR describes the S2 star, and no confidence in the claim that S2 orbits a "Black Hole". The latter is an erroneous idea based on the thoroughly obsolete second Bianchi identity without torsion, and the thoroughly obsolete Einstein field equation.
