2(5): Second Refutation of de Sitter Precession

The calculation investigates the effect of gravitation on the energy levels of the H atom. According to the standard model is de Sitter precession:

$$E_n = \left\langle \frac{p^2}{2m} \right\rangle + \left\langle U_c \right\rangle + \left\langle \frac{2nM}{r} \right\rangle \quad -(1)$$

$$= -\frac{1}{2}\left(\frac{\alpha}{n}\right)^2 mc^2 + 2mM\mathcal{G}\left\langle \frac{1}{r} \right\rangle$$

Here m is the mass of the electron, M is the earth's mass. We have:

$$\begin{aligned} m &= 9.10953 \times 10^{-31}\ kg \\ M &= 5.98 \times 10^{24}\ kg \\ \mathcal{G} &= 6.67 \times 10^{-11}\ m^3 kg^{-1} s^2 \quad -(2) \\ \alpha &= 0.0073 \\ \hbar &= 1.054 \times 10^{-34}\ Js \\ c &= 2.998 \times 10^{8}\ ms^{-1} \end{aligned}$$

We have:

$$\left\langle U_c \right\rangle = -\alpha \hbar c \left\langle \frac{1}{r} \right\rangle \quad -(3)$$

$$= -\left(\frac{\alpha}{n}\right)^2 mc^2$$

So

$$\left\langle \frac{1}{r} \right\rangle = \frac{\alpha}{n^2}\frac{m}{\hbar c} \quad -(4)$$

It follows that:

$$\left\langle \frac{2m^2}{r} \right\rangle = 2n^2 \left\langle \frac{1}{r} \right\rangle$$

$$= \frac{2m\alpha^3 M}{n^2 \hbar c} \quad -(5)$$

For the electron proton interaction. This is a negligible correction. However for the electron earth interaction:

$$\left\langle \frac{2nM}{r} \right\rangle = \frac{2nM}{r} \quad -(6)$$

where the earth's radius is:

$$r = 6.378 \times 10^{9} \text{ m} \quad -(7)$$

So
$$\langle U_g \rangle = \frac{2 \times 9.10953 \times 10^{-31} \times 5.98 \times 10^{24}}{6.378 \times 10^{9}}$$

$$= 1.708 \times 10^{-15} \text{ Joules}$$

For $n = 1$:

$$\langle U_c \rangle = -\alpha^2 mc^2$$

$$= -0.0073^2 \times 9.10953 \times 10^{-31} \times 2.998^2 \times 10^{16}$$

$$= -4.37 \times 10^{-18} \text{ Joules} \quad -(8)$$

and the energy of the H atom is:

$$\langle U_H \rangle = -2.185 \times 10^{-18} \text{ Joules} \quad -(9)$$

It is seen that the standard model's de Sitter precession gives an absurd result, it imparts an unphysical positive energy that is three orders of magnitude too large. The H atom is never free of the Earth's gravitational field.
