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Planet Mercury: Advance of Perihelion of 43" Seconds of an Arc per Century

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Abstract: Light aberrations equations along the line of sight gives results for the advance of perihelion rates of planets around their mother sun that are better than all published space-time physics and for Planet Mercury, it is equal to 43".0 of an arc per century.

Location **r** -------->>Exp ($\hat{\imath}$ w t) -------->> **S**= **r** Exp ($\hat{\imath}$ wt)
Orbit **r** -------->> light aberrations ------>> Visual Orbit **S**; Exp = Exponential
Where wt = arc tan (v/c)
Areal velocity is constant: $r^2\,\theta' = h$ Kepler's Law

We have $h = 2\pi$ a b/T; $b = a\sqrt{(1-\varepsilon^2)}$; a = mean distance value; ε = eccentricity
And $r^2\,\theta' = h = S^2\,w'$

$S = r \exp(\dot{\imath}\,wt)$; $h = [r^2 \text{Exp}(2iwt)]\,w' = r^2\theta'$
And $w' = (\theta') \exp[-2(i\,wt)]$

Then $w' = (h/r^2)\,[\text{cosine } 2(wt) - \dot{\imath} \text{ sine } 2(wt)] = (h/r^2)\,[1 - 2\text{sine}^2 (wt) - \dot{\imath} \sin 2(wt)]$
And $w' = w'(x) + \dot{\imath}\,w'(y)$; $w'(x) = (h/r^2)\,[1 - 2\text{sine}^2 (wt)]$

$\Delta w' = w'(x) - (h/r^2) = -2(h/r^2)\,\text{sine}^2 (wt) = -2(h/r^2)\,(v/c)^2$; w T = arc tan (v/c)
And (h/r^2) (Perihelion/Periastron) $= [2\pi a.a\sqrt{(1-\varepsilon^2)}]/Ta^2 (1-\varepsilon)^2 = [2\pi\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2$
$\Delta w' = [w'(x) - h/r^2] = -4\pi \{[\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2\}\,\text{sine}^2 (v/c)$ radian per second

x {[180/π;degrees]x[100years=36526days;century]x[3600;seconds in degree]

$\Delta w'' = (-720\text{x}36526\text{x}3600/T)\,\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}\,[\text{sine arc tan } (v/c)]^2$
Seconds of arc per century

The circumference of an ellipse: $2\pi a\,(1 - \varepsilon^2/4 + 3/16(\varepsilon^2)^2 - \text{--.}) \approx 2\pi a\,(1-\varepsilon^2/4)$; $R = a\,(1-\varepsilon^2/4)$
$v = \sqrt{[G\,m\,M / (m + M)\,a\,(1-\varepsilon^2/4)]} \approx \sqrt{[GM/a\,(1-\varepsilon^2/4)]}$; m<<M; Solar system

Advance of Perihelion of mercury.

G=6.673x10^-11; M=2x10^30kg; m=.32x10^24kg
ε = 0.206; T=88days; c = 299792.458 km/sec; a = 58.2km/sec

Calculations yields:
v =48.14km/sec; $[\sqrt{(1-\varepsilon^2)}]\,(1-\varepsilon)^2 = 1.552$

$$\Delta w'' = (-720 \times 36526 \times 3600/88) \times (1.552) [\text{sine arc tan}(48.14/299792)]^2 = 43.0''/\text{century}$$