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Einstein's Nemesis#1: DI Herculis Apsidal motion puzzle solution

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Abstract: This is the Solution to the "quarter of a century" motion puzzle that all 100,000 space-time Physicists and Astrophysicists could not solve by space-time physics or any other said or published physics including 109 years of Noble Prize winner physics and 400 years of Astronomy. This motion puzzle is posted on Smithsonian-NASA website SAO/NASA Type "Apsidal motion of DI Her"

Universal Mechanics Solution:

For 350 years Physicists Astronomers and Mathematicians missed Kepler's time dependent Areal velocity equation solution that produced a Newton's time dependent equation solution and these two equations put together combines classical mechanics with quantum mechanics into one universal mechanics and explain "relativity theory" as the visual effects between time dependent measurements and time independent measurements of moving objects. This new universal mechanics solution explain apsidal motion as visual effects due to light aberrations along the line of sight or the difference between time dependent measurements and time dependent measurements of the angular velocity at Apses. Apsidal motion in main stream space-time make-believe fictional physics literature is a case of bad physics ideas of fictional forces additions and bad astronomy of measurements interpretations and bad mathematicians who solved Newton's equation incomplete for 350 years. I am not only saying dumping relativity theory is the correct action but adding that dumping 100,000 space-time physicists along with relativity theory attached to them is the minimum required.

All there is in the Universe is objects of mass m moving in space (x, y, z) at a location $\mathbf{r} = \mathbf{r}(x, y, z)$. The state of any object in the Universe can be expressed as the product
$\mathbf{S} = m\,\mathbf{r}$; State = mass x location:

$\mathbf{P} = d\mathbf{S}/dt = m\,(d\mathbf{r}/dt) + (dm/dt)\,\mathbf{r}$ = Total moment
= change of location + change of mass
$= m\,v + m'\,r$; v = velocity = $d r/d t$; m' = mass change rate

$\mathbf{F} = d\mathbf{P}/dt = d^2\mathbf{S}/dt^2$ = Total force
$= m\,(d^2\mathbf{r}/dt^2) + 2(dm/dt)\,(d\mathbf{r}/dt) + (d^2m/dt^2)\,\mathbf{r}$
$= m\,\boldsymbol{\gamma} + 2m'\mathbf{v} + m''\,\mathbf{r}$; γ = acceleration; m'' = mass acceleration rate

In polar coordinates system

$\mathbf{r} = r\,\mathbf{r}_{(1)}$; $\mathbf{v} = r'\,\mathbf{r}_{(1)} + r\,\theta'\,\boldsymbol{\theta}_{(1)}$; $\boldsymbol{\gamma} = (r'' - r\theta'^2)\mathbf{r}_{(1)} + (2r'\theta' + r\,\theta'')\boldsymbol{\theta}_{(1)}$

$\mathbf{F} = m\,[(r''-r\theta'^2)\,\mathbf{r}_{(1)} + (2r'\theta' + r\,\theta'')\,\boldsymbol{\theta}_{(1)}] + 2m'[r'\,\mathbf{r}_{(1)} + r\,\theta'\,\boldsymbol{\theta}_{(1)}] + (m''\,r)\,\mathbf{r}_{(1)}$

$= [d^2(m\,r)/dt^2 - (m\,r)\theta'^2]\mathbf{r}_{(1)} + (1/mr)[d(m^2r^2\theta')/d\,t]\boldsymbol{\theta}_{(1)} = [-GmM/r^2]\mathbf{r}_{(1)}$

Proof**:**

First $\mathbf{r} = r\,[\text{cosine}\,\theta\,\hat{\mathbf{i}} + \text{sine}\,\theta\,\hat{\mathbf{J}}] = r\,\mathbf{r}_{(1)}$

Define $\mathbf{r}_{(1)} = \text{cosine}\,\theta\,\hat{\mathbf{i}} + \text{sine}\,\theta\,\hat{\mathbf{J}}$

Define $\mathbf{v} = d\,\mathbf{r}/d\,t = r'\,\mathbf{r}_{(1)} + r\,d[\mathbf{r}_{(1)}]/d\,t$

$= r'\,\mathbf{r}_{(1)} + r\,\theta'[-\,\text{sine}\,\theta\,\hat{\mathbf{i}} + \text{cosine}\,\theta\hat{J}]$

$= r'\,\mathbf{r}_{(1)} + r\,\theta'\,\boldsymbol{\theta}_{(1)}$

Define $\boldsymbol{\theta}_{(1)} = -\text{sine}\,\theta\,\hat{i} + \text{cosine}\,\theta\,\hat{J}$;

And with $\mathbf{r}_{(1)} = \text{cosine}\,\theta\,\hat{i} + \text{sine}\,\theta\,\hat{J}$

Then $d\,[\boldsymbol{\theta}_{(1)}]/d\,t = \theta'\,[-\,\text{cosine}\,\theta\,\hat{i} - \text{sine}\,\theta\,\hat{J} = -\,\theta'\,\mathbf{r}_{(1)}$

And $d\,[\mathbf{r}_{(1)}]/d\,t = \theta'\,[-\text{sine}\,\theta\,\hat{i} + \text{cosine}\,\theta\,\hat{J}] = \theta'\,\boldsymbol{\theta}_{(1)}$

Define $\boldsymbol{\gamma} = d\,[r'\,\mathbf{r}_{(1)} + r\,\theta'\,\boldsymbol{\theta}_{(1)}]\,/d\,t$

$= r''\,r_{(1)} + r'd\,[\mathbf{r}_{(1)}]/d\,t + r'\,\theta'\,\mathbf{r}_{(1)} + r\,\theta''\,\mathbf{r}_{(1)} + r\,\theta'd\,[\theta_{(1)}]/d\,t$

$\boldsymbol{\gamma} = (r'' - r\theta'^2)\,\mathbf{r}_{(1)} + (2r'\theta' + r\,\theta'')\,\boldsymbol{\theta}_{(1)}$

With $d^2\,(m\,r)/dt^2 - (m\,r)\,\theta'^2 = -GmM/r^2$ Newton's Gravitational Equation (1)

And $d\,(m^2r^2\theta')/d\,t = 0$ Central force law (2)

<u>(2)</u> : $d(m^2r^2\theta')/d\,t = 0 \iff m^2r^2\theta' = [m^2(\theta,0)\,m^2(0,t)][\,r^2(\theta,0)r^2(0,t)][\theta'(\theta,t)]$

$= [m^2\,(\theta, t)]\,[r^2\,(\theta, t)]\,[\theta'\,(\theta, t)]$

$= [m^2\,(\theta, 0)]\,[r^2\,(\theta, 0)]\,[\theta'(\theta, 0)]$

$= [m^2\,(\theta, 0)]\,h\,(\theta, 0);\ h\,(\theta, 0) = [r^2\,(\theta, 0)]\,[\theta'(\theta, 0)]$

$= H\,(0, 0) = m^2\,(0, 0)\,h\,(0, 0)$

$= m^2\,(0, 0)\,r^2\,(0, 0)\,\theta'(0, 0)$

<u>With $m = m\,(\theta, 0)\,m\,(0, t) = m\,(\theta, 0)\,\text{Exp}\,[\lambda\,(m) + \grave{\imath}\,\omega\,(m)]$</u> t; Exp = Exponential

And $m\,(0, t) = \text{Exp}\,[\lambda\,(m) + \grave{\imath}\,\omega\,(m)]\,t$

<u>Also, $r = r\,(\theta, 0)\,r\,(0, t) = r\,(\theta, 0)\,\text{Exp}\,[\lambda\,(r) + \grave{\imath}\,\omega\,(r)]\,t$</u>

With $r\,(0, t) = \text{Exp}\,[\lambda\,(r) + \grave{\imath}\,\omega\,(r)]\,t$

<u>Then $\theta'(\theta, t) = \{H(0, 0)/[m^2(\theta,0)\,r(\theta,0)]\}\text{Exp}\{-2\{[\lambda(m) + \lambda(r)]t + \grave{\imath}\,[\omega(m) + \omega(r)]t\}\}$</u> -----I

<u>And $\theta'(\theta, t) = \theta'\,(\theta, 0)]\}\,\text{Exp}\,\{-2\{[\lambda\,(m) + \lambda\,(r)]\,t + \grave{\imath}\,[\omega\,(m) + \omega\,(r)]\,t\}\}$</u> --------------------I

And, $\theta'(\theta, t) = \theta'\,(\theta, 0)\,\theta'\,(0, t)$

And $\theta'\,(0, t) = \text{Exp}\,\{-2\{[\lambda\,(m) + \lambda(r)]\,t + \grave{\imath}\,[\omega\,(m) + \omega(r)]\,t\}$

Also $\theta'(\theta, 0) = H\,(0, 0)/\,m^2\,(\theta, 0)\,r^2\,(\theta, 0)$

And $\theta'(0, 0) = \{H\,(0, 0)/\,[m^2\,(0, 0)\,r\,(0, 0)]\}$

<u>With (1)</u>: $d^2\,(m\,r)/dt^2 - (m\,r)\,\theta'^2 = -GmM/r^2 = -Gm^3M/m^2r^2$

And $d^2\,(m\,r)/dt^2 - (m\,r)\,\theta'^2 = -Gm^3\,(\theta, 0)\,m^3\,(0, t)\,M/\,(m^2r^2)$

Let $m\,r = 1/u$

Then $d (m r)/d t = -u'/u^2 = - (1/u^2) (\theta') d u/d \theta = (- \theta'/u^2) d u/d \theta = -H d u/d \theta$
And $d^2 (m r)/dt^2 = -H\theta' d^2u/d\theta^2 = - Hu^2 [d^2u/d\theta^2]$

$-Hu^2 [d^2u/d\theta^2] - (1/u) (Hu^2)^2 = -Gm^3 (\theta, 0) m^3 (0, t) Mu^2$
$[d^2u/ d\theta^2] + u = Gm^3 (\theta, 0) m^3 (0, t) M/ H^2$

$t = 0; m^3 (0, 0) = 1$
$u = Gm^3 (\theta, 0) M/ H^2 + A \text{ cosine } \theta = Gm (\theta, 0) M (\theta, 0)/ h^2 (\theta, 0)$

And $m r = 1/u = 1/ [Gm (\theta, 0) M (\theta, 0)/ h (\theta, 0) + A \text{ cosine } \theta]$
$= [h^2/ Gm (\theta, 0) M (\theta, 0)]/ \{1 + [Ah^2/ Gm (\theta, 0) M (\theta, 0)] [\text{cosine } \theta]\}$
$= [h^2/Gm (\theta, 0) M (\theta, 0)]/ (1 + \varepsilon \text{ cosine } \theta)$

Then $m (\theta, 0) r (\theta, 0) = [a (1-\varepsilon^2)/ (1+\varepsilon\cos\theta)] m (\theta, 0)$
Dividing by $m (\theta, 0)$
Then $r (\theta, 0) = a (1-\varepsilon^2)/ (1+\varepsilon\cos\theta)$
This is Newton's Classical Equation solution of two body problem which is the equation of an ellipse of semi-major axis of length a and semi minor axis $b = a \sqrt{(1 - \varepsilon^2)}$ and focus length $c = \varepsilon a$
And $m r = m (\theta, t) r (\theta, t) = m (\theta, 0) m (0, t) r (\theta, 0) r (0, t)$
Then, $r (\theta, t) = [a (1-\varepsilon^2)/ (1+\varepsilon\cos\theta)] \{\text{Exp} [\lambda(r) + i \omega (r)] t\}$ ---------------------------------- II
This is Newton's time dependent equation that is missed for 350 years
If $\lambda (m) \approx 0$ fixed mass and $\lambda(r) \approx 0$ fixed orbit; then
Then $r (\theta, t) = r (\theta, 0) r (0, t) = [a (1-\varepsilon^2)/ (1+\varepsilon \text{ cosine } \theta)] \text{ Exp } i \omega (r) t$
And $m = m (\theta, 0) \text{ Exp} [i \omega (m) t] = m (\theta, 0) \text{ Exp } i \omega (m) t$

We Have $\theta'(0, 0) = h (0, 0)/r^2 (0, 0) = 2\pi ab/ Ta^2 (1-\varepsilon)^2$
$= 2\pi a^2 [\sqrt{(1-\varepsilon^2)}]/T a^2 (1-\varepsilon)^2$
$= 2\pi [\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2$
Then $\theta'(0, t) = \{2\pi [\sqrt{(1-\varepsilon^2)}]/ T (1-\varepsilon)^2\} \text{ Exp} \{-2[\omega (m) + \omega (r)] t$
$= \{2\pi [\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\} \{\text{cosine } 2[\omega (m) + \omega (r)] t - i \sin 2[\omega (m) + \omega (r)] t\}$
$= \theta'(0, 0) \{1- 2\sin^2 [\omega (m) + \omega (r)] t\}$
$- i\, 2i\, \theta'(0, 0) \sin [\omega (m) + \omega (r)] t \text{ cosine } [\omega (m) + \omega (r)] t$
Then $\theta'(0, t) = \theta'(0, 0) \{1 - 2\text{sine}^2 [\omega (m) t + \omega (r) t]\}$
$- 2i\, \theta'(0, 0) \sin [\omega (m) + \omega(r)] t \text{ cosine } [\omega (m) + \omega(r)] t$
$\Delta \theta' (0, t) = \text{Real } \Delta \theta' (0, t) + \text{Imaginary } \Delta \theta (0, t)$
$\text{Real } \Delta \theta (0, t) = \theta'(0, 0) \{1 - 2 \text{ sine}^2 [\omega (m) t\, \omega(r) t]\}$

Let $W (ob) = \Delta \theta' (0, t) \text{ (observed)} = \text{Real } \Delta \theta (0, t) - \theta'(0, 0)$
$= -2\theta'(0, 0) \text{ sine}^2 [\omega (m) t + \omega(r) t]$
$= -2[2\pi [\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2] \text{ sine}^2 [\omega (m) t + \omega(r) t]$
If this apsidal motion is to be found as visual effects, then
With, $v°$ = spin velocity; v^* = orbital velocity; $v°/c = \tan \omega (m) T°$; $v^*/c = \tan \omega (r) T^*$
Where $T°$ = spin period; T^* = orbital period
And $\omega (m) T° = \text{Inverse tan } v°/c$; $\omega (r) T^* = \text{Inverse tan } v^*/c$
$W (ob) = -4 \pi [\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2] \text{ sine}^2 [\text{Inverse tan } v°/c + \text{Inverse tan } v^*/c]$ radians

Multiplication by $180/\pi$
W (ob) = $(-720/T)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}\ \text{sine}^2\ \{\text{Inverse tan}\ [v°/c + v^*/c]/[1 - v° v^*/c^2]\}$ degrees and multiplication by 1 century = 36526 days and using T in days
W° (ob) = $(-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ x
$\text{sine}^2\ \{\text{Inverse tan}\ [v°/c + v^*/c]/[1 - v° v^*/c^2]\}$ degrees/100 years

Approximations I

With $v° << c$ and $v^* << c$, then $v° v^* <<< c^2$ and $[1 - v° v^*/c^2] \approx 1$
Then W° (ob) $\approx (-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ x sine^2 Inverse tan $[v°/c + v^*/c]$ degrees/100 years

Approximations II

With $v° << c$ and $v^* << c$, then sine Inverse tan $[v°/c + v^*/c] \approx (v° + v^*)/c$

W° (ob) = $(-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ x $[(v° + v^*)/c]^2$ degrees/100 years
This is the equation that gives the correct apsidal motion rates
The circumference of an ellipse: $2\pi a\ (1 - \varepsilon^2/4 + 3/16(\varepsilon^2)^2 - --.) \approx 2\pi a\ (1-\varepsilon^2/4)$; $R = a\ (1-\varepsilon^2/4)$
Where $v\ (m) = \sqrt{[GM^2/(m + M)\ a\ (1-\varepsilon^2/4)]}$
And $v\ (M) = \sqrt{[Gm^2/(m + M)\ a\ (1-\varepsilon^2/4)]}$

DI Her Apsidal motion solution:

Data: T=10.55days $r_{(m)} = 0.0621$ $m=5.15M_{(0)}$ $R_{(m)}=2.68R_{(0)}$ $[v°_{(m)}, v°_{(M)}]=[45,45]$
And $\varepsilon = 0.4882$; $r_{(M)} = 0.0574$ $M=4.52\ M_{(0)}$ $R_{(M)} = 2.48$; $m + M = 9.67\ M_{(0)}$

$1-\varepsilon = 0.5118$; $(1-\varepsilon^2/4) = 0.94$; $[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2 = 3.33181$
G=6.673x10^-11; $M_{(0)}$ = 1.98892x19^30kg; $R_{(0)}$ = 0.696x10^9m

Calculations

$V\ (m) = \sqrt{[GM^2/(m + M)\ a\ (1-\varepsilon^2/4)]} = 99.88$ km/sec
$V\ (M) = \sqrt{[Gm^2/(m + M)\ a\ (1-\varepsilon^2/4)]} = 113.8$km/sec

Apsidal motion is given by this formula:

W° (ob) = $(-720x36526/T)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2]\}\ [(v° + v^*)/c]^2$ degrees/100 years

And, $v°$ (spin) = $v°$ (cm) = $m\ v°\ (m) + M\ v°\ (M)/\sum m$
= 45 km/s
And $\sigma° = \sqrt{\{\sum [v°-v°\ (cm)]^2/2\}}$
Then $\sigma° = 0$
With, v^*(Orbit) = v (cm)
And, $v^* = v\ (cm) = [m\ v\ (m) + M\ v\ (M)]/(m + M)$
Then, $v^* = v\ (cm) = \sum m\ v/\sum m = [(5.15x99.88) + (4.52x113.8)]/9.67 = 106.38$km/s
And $\sigma^* = \sqrt{\{\sum [v^*-v^*\ (cm)]^2/2\}} = \sqrt{\{[99.88 - 106.38]^2 + [113.8-106.38]^2\}/2}$
= 6.975184585 km/sec
W° (observed) = $(-720x36526/T)\ \{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}\ \text{sine}^2$ [Inverse tan 106.38/300,000]
= (-720x36526/10.55) (3.33181) $(106.38/300,000)^2$
W° (observed) = 1.04433°
References: Go to Smithsonian/NASA website SAO/NASA and type:

1- Apsidal motion of DI Her: Dr Edward Guinan and Dr Frank Maloney; 1985.
2- New Apsidal Motion of DI Her: Dr Edward Guinan and Dr Frank Maloney; 1994.
3- D. YA. Martynov and KH. F. Khaliulullin 1980
4- Petrie et al.1967