Astrometric binarity: how large of a proper motion is possible?

Say $P = 3\,d$, $M_1 = M_2 = M_\odot$

$$F = \frac{GMm}{r^2}$$

$$[G] = [F]\,\frac{L^2}{M^2} = \frac{MLT^{-2}L^2}{M^2} = \frac{\cancel{M}\,L^3}{MT^2}$$

$$\frac{P^2}{a^3} = \frac{4\pi^2}{GM_{tot}}$$

$$a^3 = \frac{GM_{tot}}{4\pi^2}\,P^2$$

$$V_{orb} = \frac{2\pi a}{P}$$

$$= \frac{2\pi}{P}\cdot\left(\frac{GM_{tot}}{4\pi^2}\,P^2\right)^{1/3}$$

$V_{orb} = 186$ km/s. $= 1.243\cdot10^{-6}$ AU/s

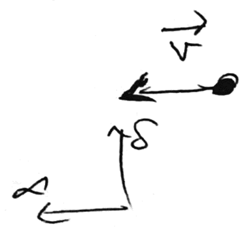
reality:

How fast is this, projected on-sky?

Note: $\mu_\alpha \overset{?}{=} \frac{v_\alpha}{d}$

(proper motions: mas/yr typically... means yes, units are velocities)

sky plane:



$$\mu_\alpha < \frac{|v_{orb}|}{d}$$

$$\mu_\alpha < \frac{186\ \text{km/s}}{d}$$

Say $d = 760$ pc (as for TIC 859480036)

↳ ~~$\mu_\alpha = 1.64\cdot10^{-9}$ arcsec~~

$$\mu_\alpha < \frac{|v_{orb}|}{d} = \frac{1.24\cdot10^{-6}\,(\text{AU/s})}{760\ \text{pc}} = 1.64\cdot10^{-9}\ \text{arcsec}\ s^{-1}$$

↳ $\mu_\alpha < 52$ mas/yr. which is seen in TIC 859480036

... and throwing it off by 0.5 mas yr^{-1} would require $V_{orb} = \frac{186\ \text{km/s}}{100} = 1.86\ \text{km}\,s^{-1}$.

If true, could get M_{tot} ...

$$V_{orb} = \frac{2\pi}{P} \cdot \left(\frac{G M_{tot}}{4\pi^2} P^2 \right)^{1/3}$$

$$\left(\frac{P}{2\pi} V_{orb} \right)^3 \cdot \frac{4\pi^2}{G P^2} = M_{tot}$$

uh... missing something...

$$K_1 = \frac{28.4 \ \mathrm{m\,s^{-1}}}{(1-e^2)^{1/2}} \frac{m_2 \sin i}{M_{jup}} \left(\frac{M_1 + M_2}{M_\odot} \right)^{-2/3} \left(\frac{P}{1\,\mathrm{yr}} \right)^{-1/3}$$

Would give, if $K_1 = 1.8 \ \mathrm{km\,s^{-1}}$ (as guessed from pm, dec)

$m_2 \sin i = 16 \ M_{jup}$ ...

(assuming $m_{tot} = 1.5 \ M_\odot$)