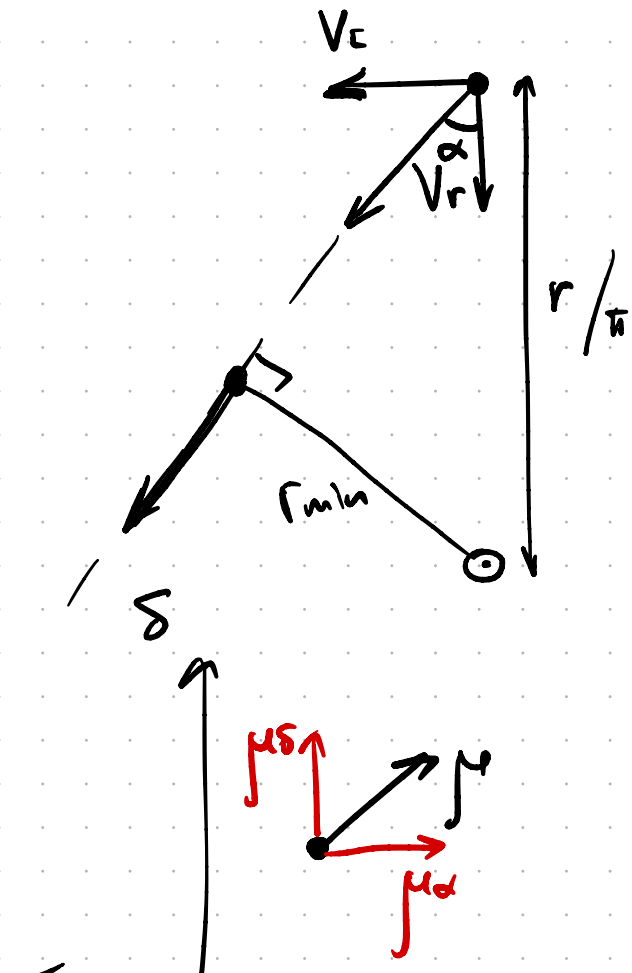
$$\Delta\lambda = 1\,\text{Å}$$

$$\frac{\Delta\lambda}{\lambda} = \frac{V_r}{c} \rightarrow V_r$$



$$V_T = 4{,}74\,\mu r$$

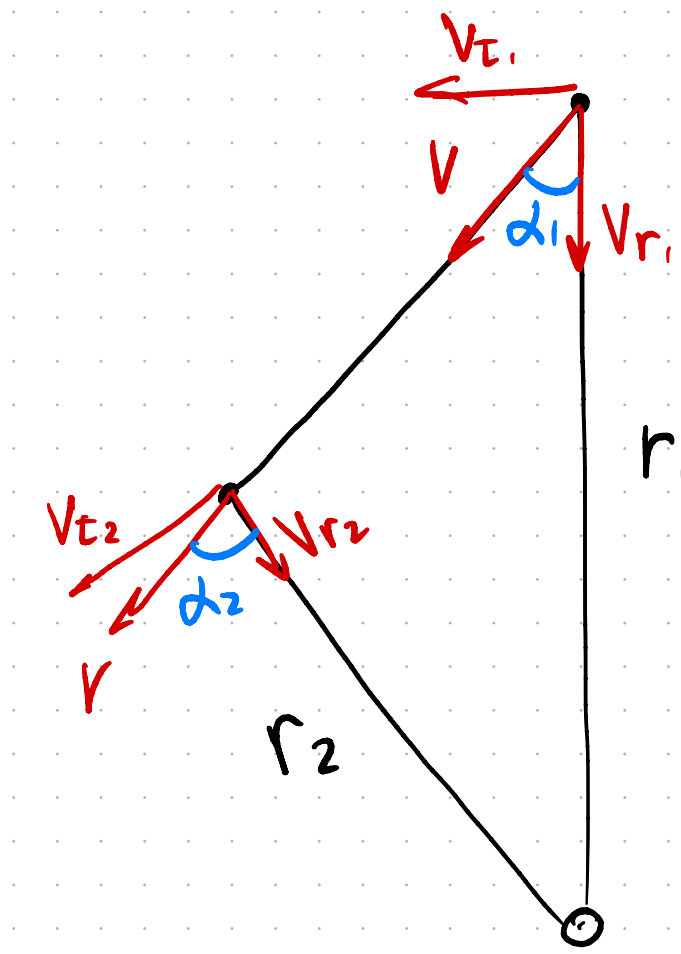
$[V_t] = км/с$

$[\mu] = ''/год$

$[r] = пк$

$$\mu = \sqrt{\mu_\delta^2 + \mu_\alpha^2 \cdot \cos^2\delta}$$

$$V = \sqrt{V_r^2 + V_t^2}$$



$$\frac{r_1}{\sin(180-\alpha_2)} = \frac{r_2}{\sin\alpha_1}$$

$$\Updownarrow$$

$$\frac{r_1}{\sin\alpha_2} = \frac{r_2}{\sin\alpha_1} \Rightarrow \frac{r_1}{r_2} = \frac{\sin\alpha_2}{\sin\alpha_1}$$

$$V_t = 4{,}74\,\mu r$$

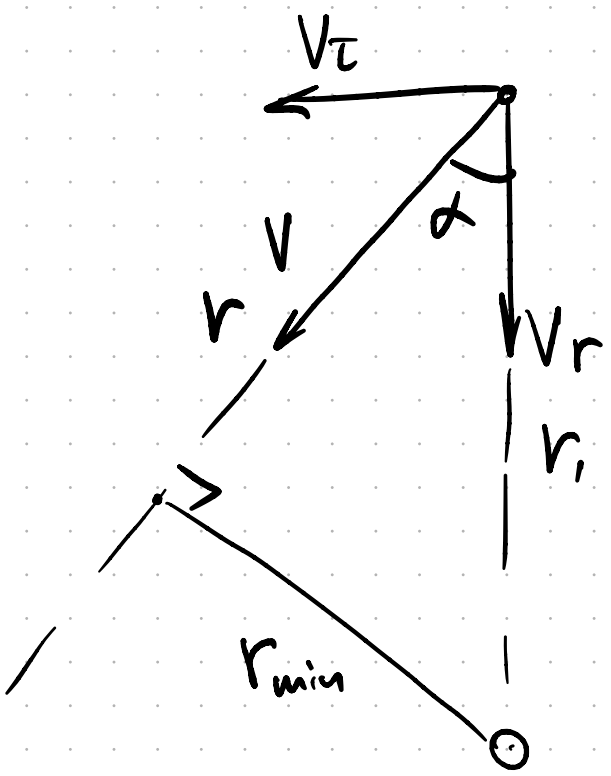
$$\frac{V_{T_1}}{V_{t_2}} = \frac{\mu_1 r_1}{\mu_2 r_2}$$

$$V_T = V \cdot \sin\alpha$$

$$\frac{\mu_1}{\mu_2} \cdot \frac{\sin\alpha_2}{\sin\alpha_1} = \frac{\sin\alpha_1}{\sin\alpha_2} \Rightarrow \frac{\sin\alpha_1}{\sin\alpha_2} = \sqrt{\frac{\mu_1}{\mu_2}} = \sqrt{4} = 2$$

$$\frac{r_1}{r_2} = \frac{1}{2}$$

$$\frac{\frac{L}{4\pi r_1^2}}{\frac{L}{4\pi r_2^2}} = 10^{0{,}4(m_2 - m_1)} \Rightarrow m_2 = m_1 - 5\lg\frac{r_1}{r_2} \approx \boxed{8{,}^m5}$$



$V_r = -111$ км/с

$V_\tau = \frac{4{,}74\mu}{\pi} = 89{,}6$ км/с

$\mu = \sqrt{\mu_\delta^2 + \mu_\alpha^2 \cdot \cos^2\delta}$

$V = \sqrt{V_r^2 + V_\tau^2} = 142{,}7$ км/с

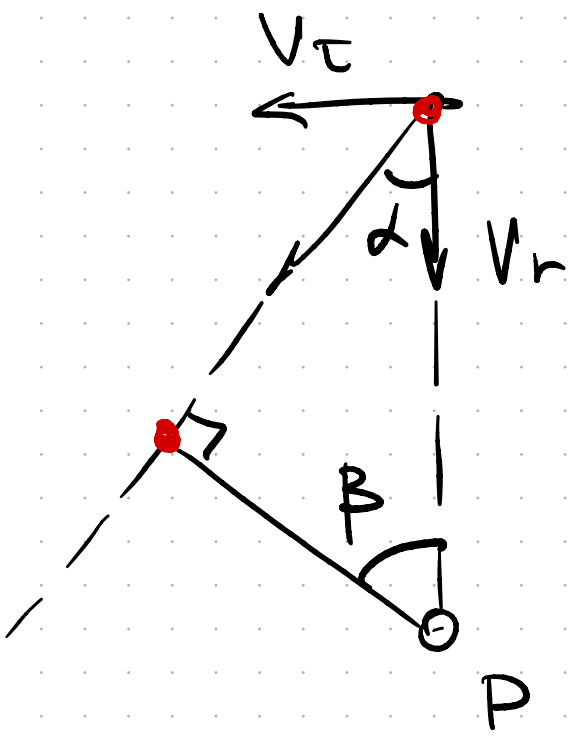
$\operatorname{tg}\alpha = \frac{V_\tau}{V_r} = 38{,}9^\circ$

$r_{min} = r_1 \cdot \sin\alpha = 1{,}15$ пк

$m_{max} = m_0 - 5\lg\frac{r_1}{r_{min}} = \boxed{8^m{,}52}$

$r = r_1 \cdot \cos\alpha = 1{,}42$ пк

$t = \frac{r}{V} = \frac{1{,}42 \cdot 206265 \cdot 1{,}5 \cdot 10^8 \text{ км}}{142{,}7 \text{ км/с}} = 3{,}08 \cdot 10^{11}$ с $\approx \boxed{9800 \text{ лет} \sim 10^4}$



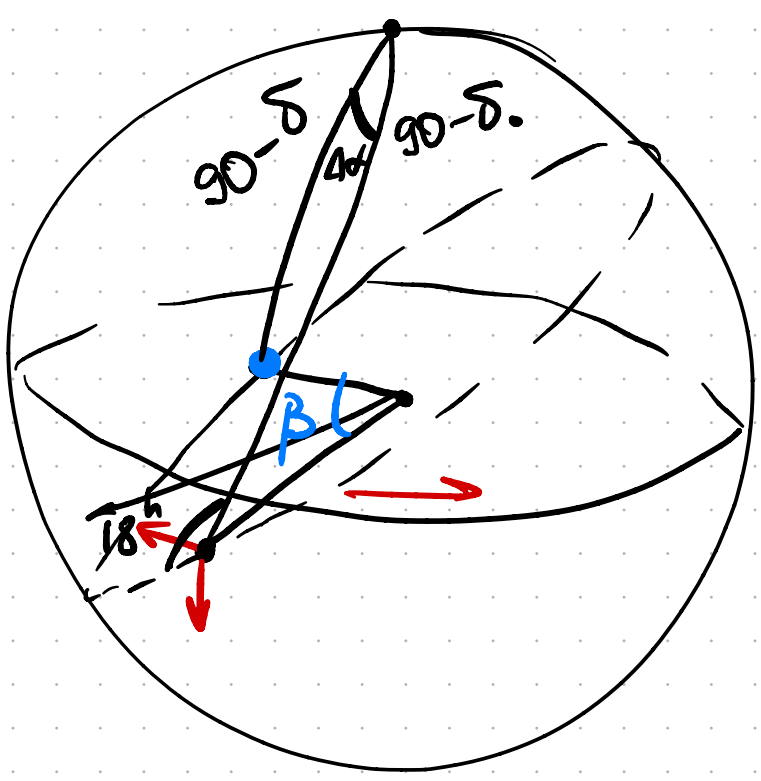
$V_r = -14{,}52$ км/с

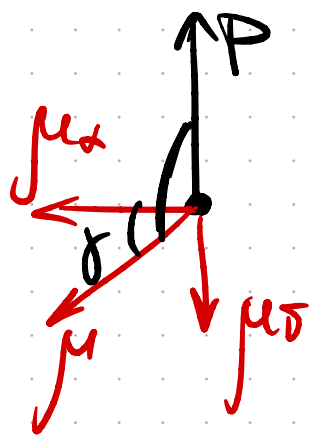
$V_\tau = 4{,}74\mu r = 0{,}04$ км/с

$V = 14{,}52$ км/с

$\alpha \approx 0{,}158^\circ$

$\beta = 90^\circ - \alpha = 89{,}8^\circ$





$\operatorname{tg}\gamma = \frac{\mu_\delta}{\mu_\alpha}$

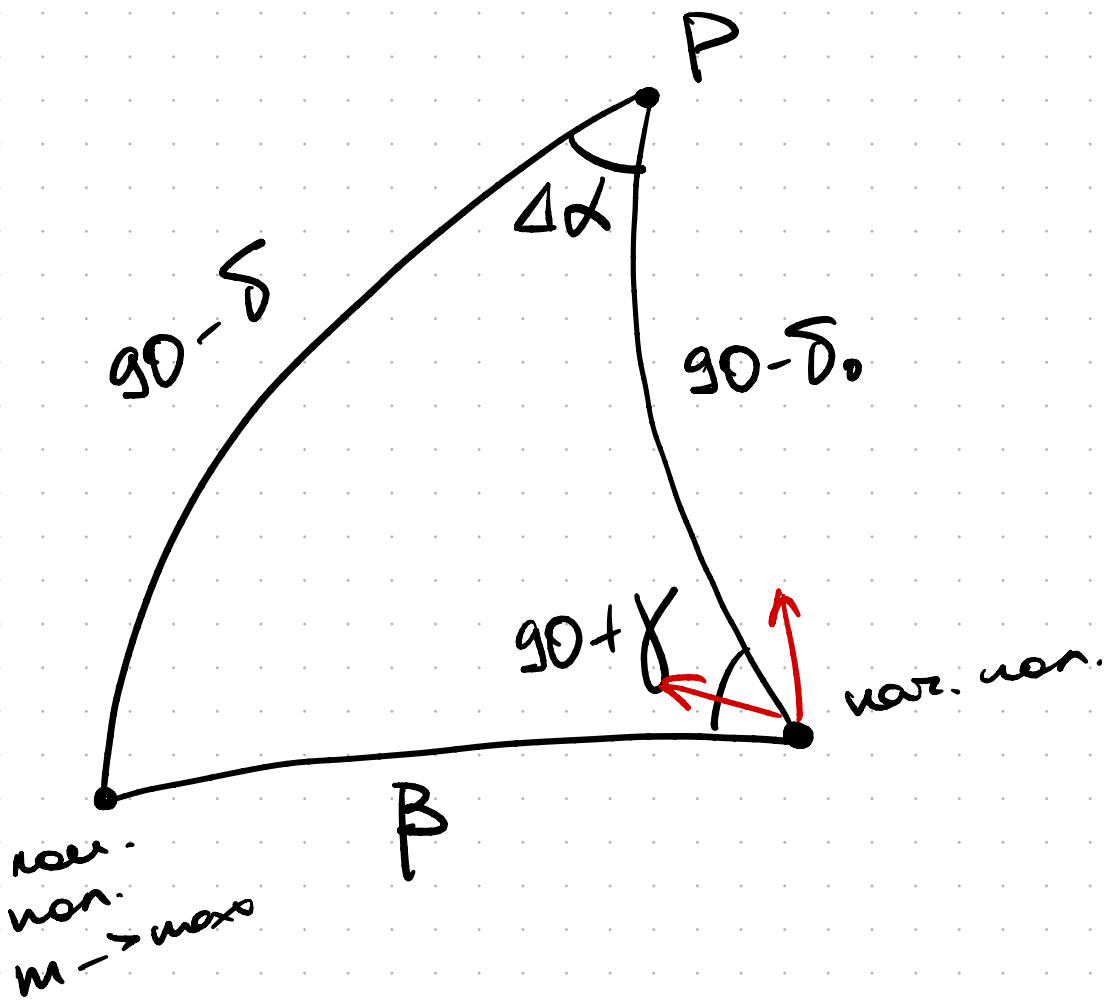
$\gamma = 3{,}48^\circ$

$\cos(90-\delta) = \cos(90-\delta_0)\cdot\cos\beta + \sin(90-\delta_0)\cdot\sin\beta\cdot\cos(90+\gamma)$

$\boxed{\delta = -3{,}5^\circ}$

$\frac{\sin\beta}{\sin\Delta\alpha} = \frac{\sin(90-\delta)}{\sin(90+\gamma)} \rightarrow \Delta\alpha$

$\boxed{\alpha = 12^h\,13^m}$


P
Δα
90-δ
90-δ₀
90+γ
nar. nar.
B
nar.
nar.
m -> max