

Determination of the mass distribution in the Galactic centre from the stellar motions

Jaroslava Schovancová

Supervisor: Dr. Ladislav Šubr

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Spherical Power-law Mass-density Distribution

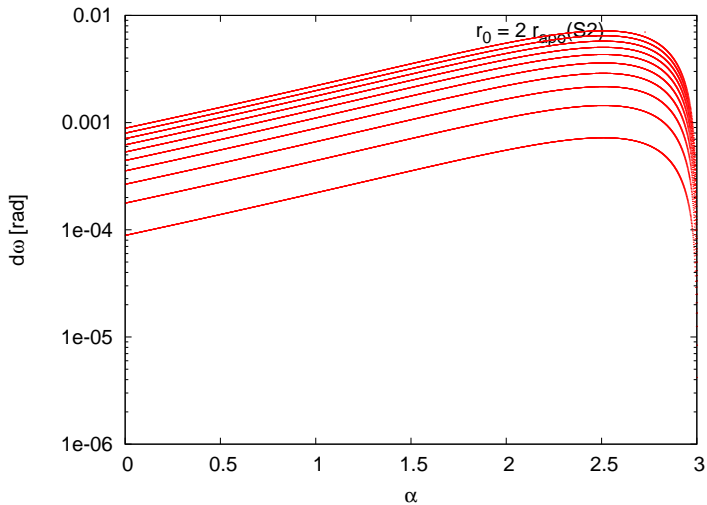
- ▶ central potential of the BH
- ▶ perturbation: spherical power-law profile in mass-density

$$\rho(r) = \rho_0 \left(\frac{r_0}{r} \right)^\alpha$$

- ▶ two approaches:
 - ▶ defined mass $M \ll M_\bullet$ in a sphere of $r_0 \sim a_{S2}$
 - ▶ M_\bullet mass in a sphere of $r_0 \gg a_{S2}$
- ▶ analytic formula for the apsidal precession rate
Ivanov et al. (2005):

$$\delta\omega = \frac{2}{s-1} \left(\frac{a}{r_0} \right)^s \frac{d}{d\epsilon} \left(\epsilon^{2s+1} \int_0^\pi \frac{d\phi}{(1 + e \cos \phi)^{s+1}} \right)$$

where $s = 3 - \alpha$, $\epsilon = \sqrt{1 - e^2}$

Apocentre Shift: $r_0 \sim a_{S2}$ 

Apocentre Shift: $r_0 \sim 10^3 a_{S2}$ 