

Qualifying Exam of Galactic Astrophysics (2023)

1. The **Plummer model** was originally used to describe globular clusters. The potential has the simple spherical form

$$\Phi(R) = -\frac{GM}{\sqrt{R^2 + a^2}}.$$

- (a) Please find out its form of radial density distribution $\rho(R)$. (20%)
 - (b) Explain the physical meaning of the parameter a . (20%)
2.
 - (a) Please explain the physics of Lindblad Resonance. (20%)
 - (b) Please describe the physics of pattern formation of spiral arm on the spiral galaxies. (20%)
 3. Please write down the Jeans equations of Collisionless system? (20%)