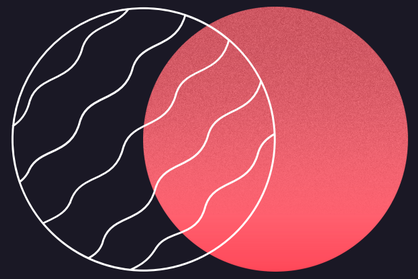


A self-consistent wave description of axion minicluster and their survival in the galaxy

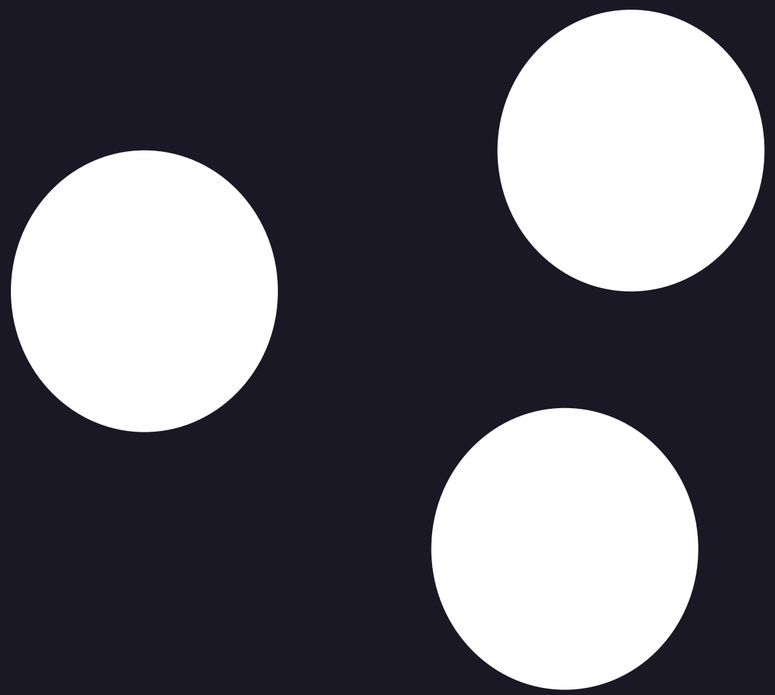
V.Dandoy, T.Schwetz, E.Todarello

ArXiv: [2206.04619]

August 9th

Patras 2022

DM in the galaxy



- In some scenarios, axions are bound in **axion miniclusters**

Is this still true today?

How to know if they survived?

1. *How to characterize the minicluster?*

→ Axions are described by a classical field

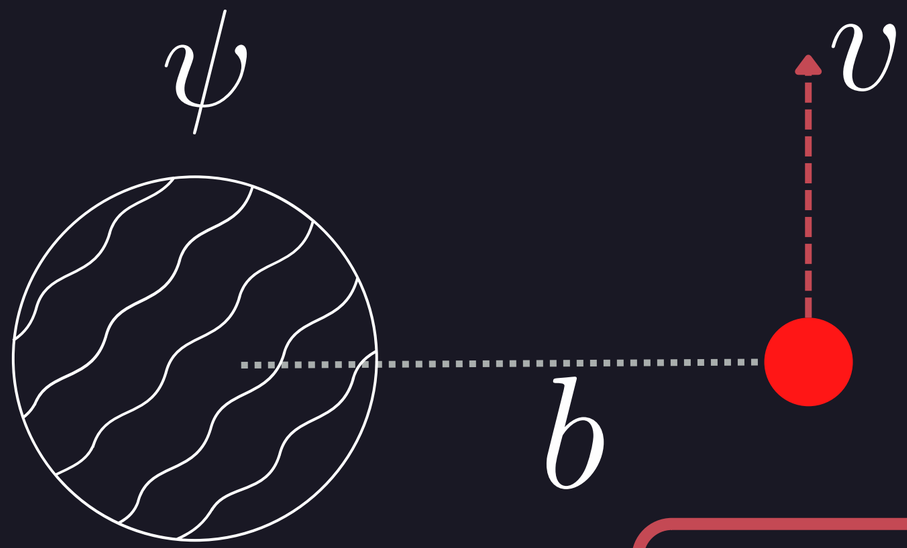
→ Wave function for a given density profile?

$$i\partial_t\psi = \left(-\frac{\nabla^2}{2m_a} + m_a\phi(r)\right)\psi$$

$$\nabla^2\phi = 4\pi G m_a |\psi|^2$$

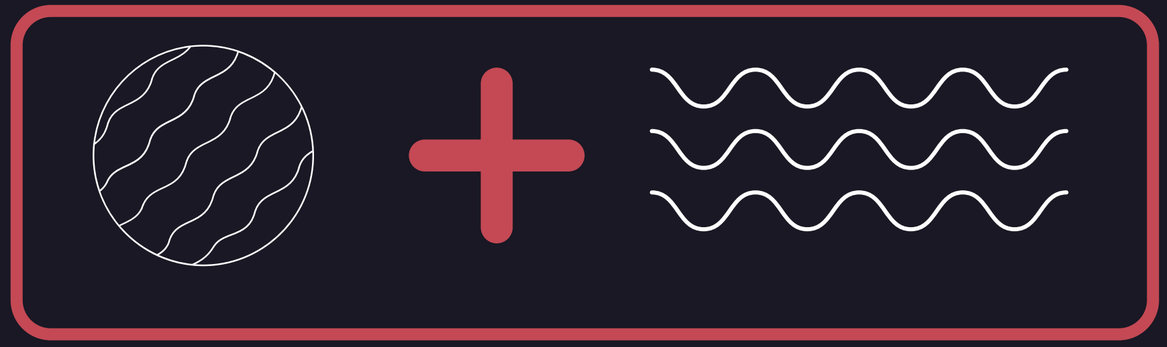
How to know if they survived?

2. How does it interact with a star?



The star creates a time dependent perturbation

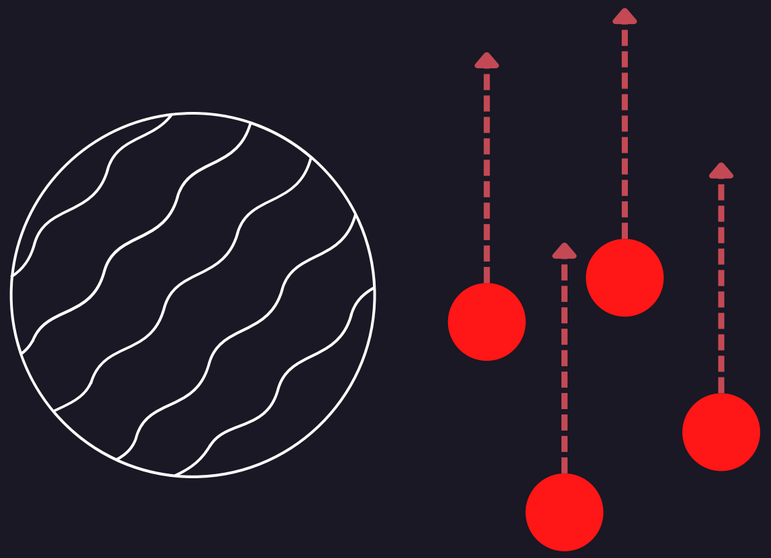
$$H_1(t) = -\frac{GM_* m_a r^2}{(b^2 + v^2 t^2)^{3/2}} P_2(\cos\gamma(t))$$

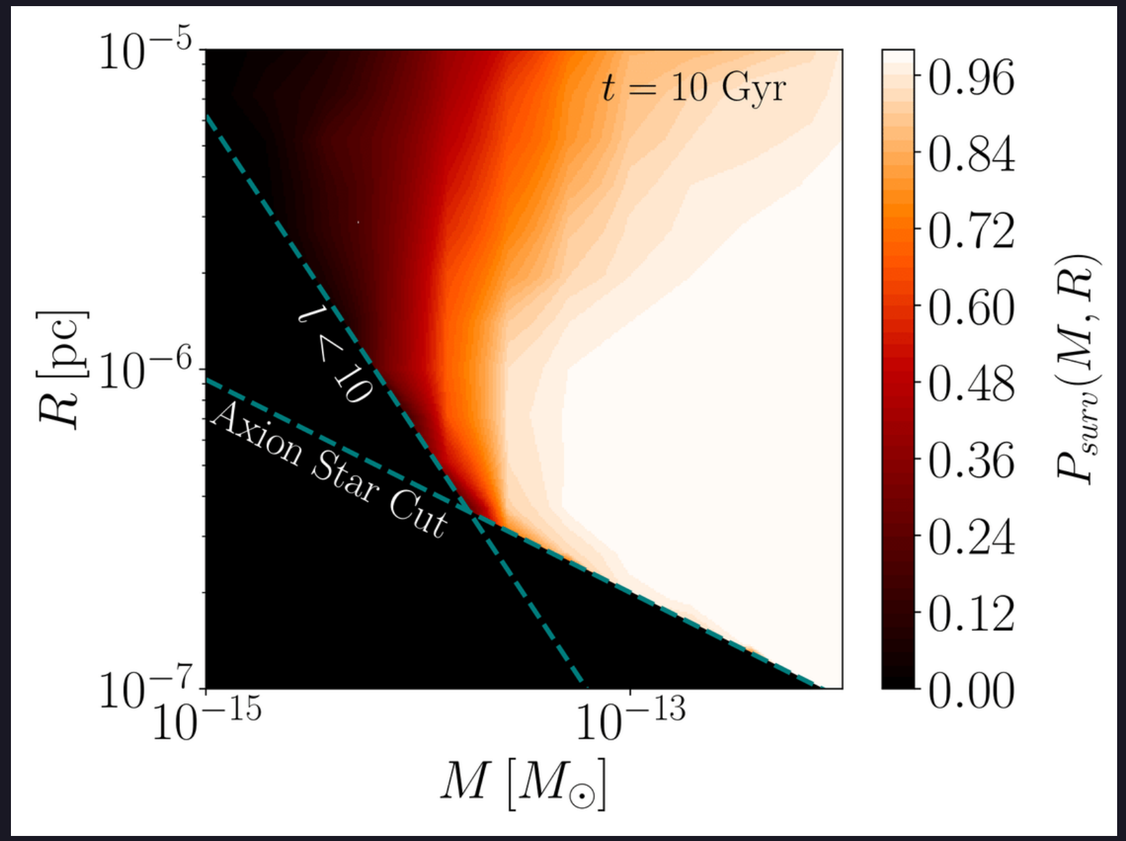


Final state

How to know if they survived?

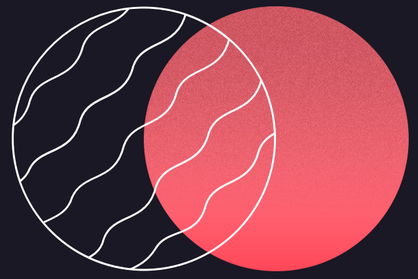
3. Simulate their evolution in the galaxy





Simulate all their lifetime interactions and extract the survival

Thank you!



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