

Title: Session 2 - Luna Zagorac

Speakers:

Collection: POSTDOC WELCOME 2022

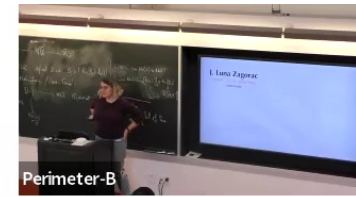
Date: October 24, 2022 - 11:50 AM

URL: <https://pirsa.org/22100126>

J. Luna Zagorac

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Cosmology



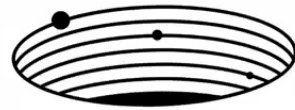
J. Luna Zagorac

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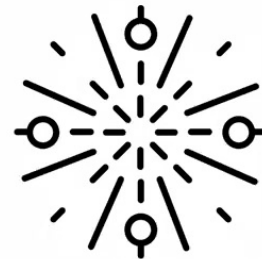
Cosmology



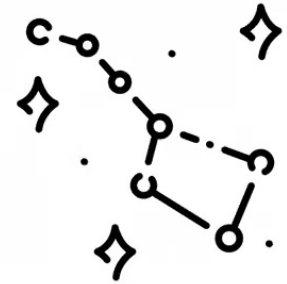
Fuzzy Dark Matter



*Primordial
Black Holes*



Inflation & WIMPs



*Egyptian
archaeoastronomy*

UltraLight Dark Matter

UltraLight Dark Matter (ULDM):

- is an axion-like scalar boson
- has low mass: $\sim 10^{-22}$ eV
- forms Bose-Einstein condensates
- helps with small-scale problems
 - e.g. core-cusp problem (right)
- cool phenomenology!

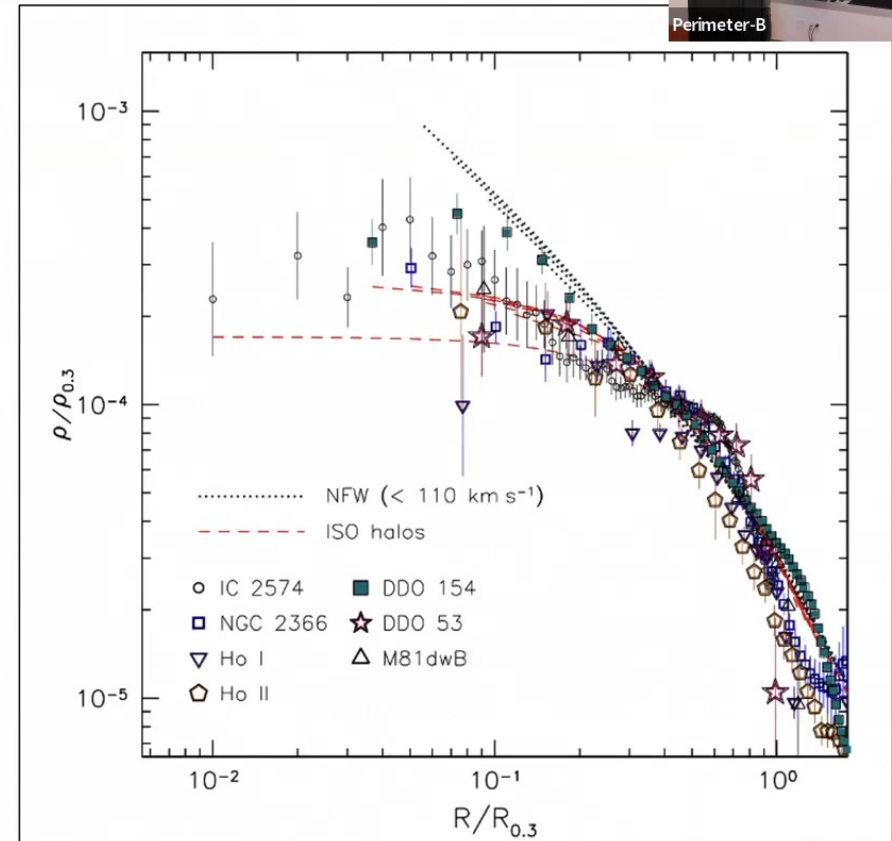
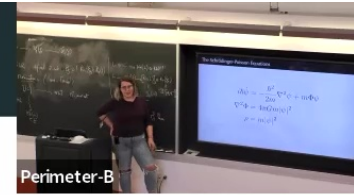


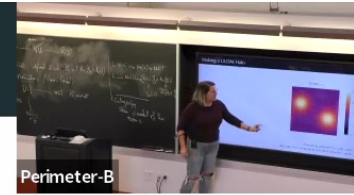
Fig. 7 in Oh, Se-Heon, et al. AJ, 2011.

The Schrödinger-Poisson Equations

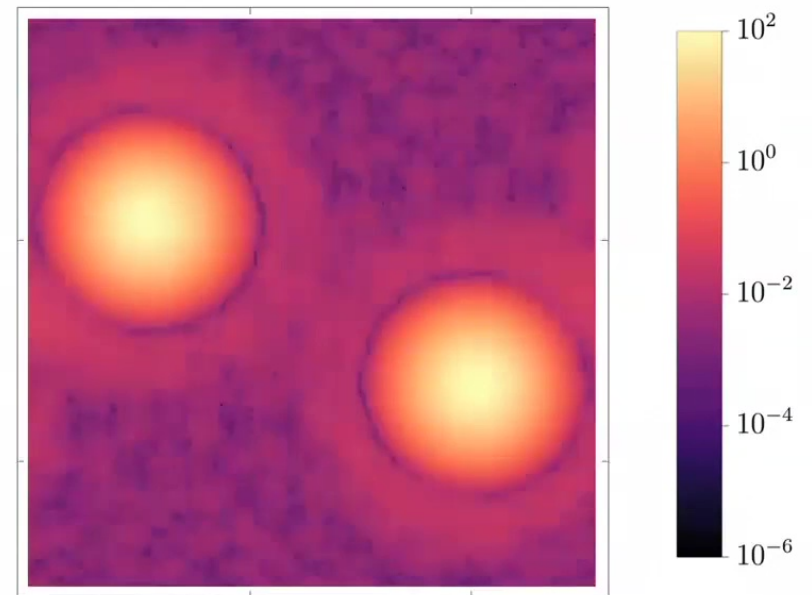


$$i\hbar\dot{\psi} = -\frac{\hbar^2}{2m}\nabla^2\psi + m\Phi\psi$$
$$\nabla^2\Phi = 4\pi Gm|\psi|^2$$
$$\rho = m|\psi|^2$$

Making a ULDM Halo

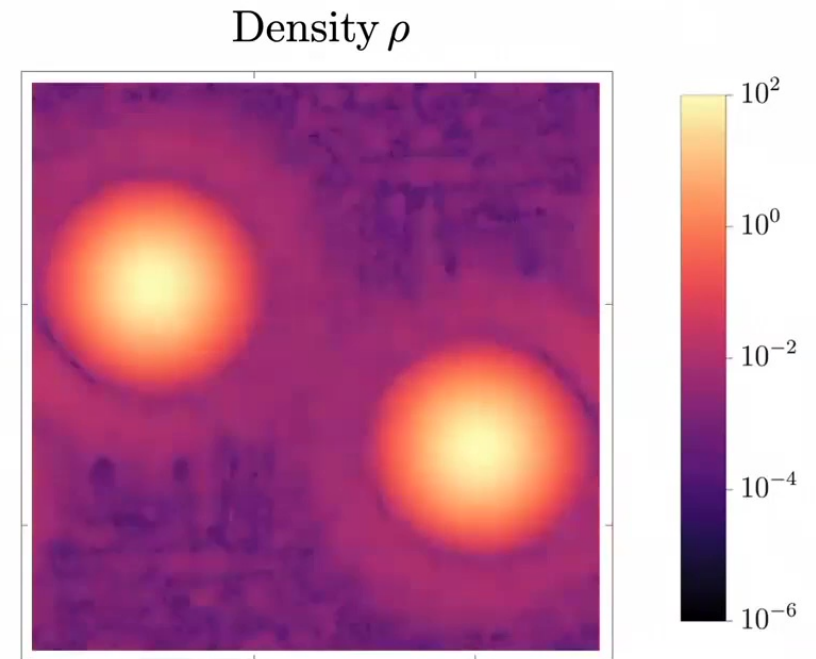
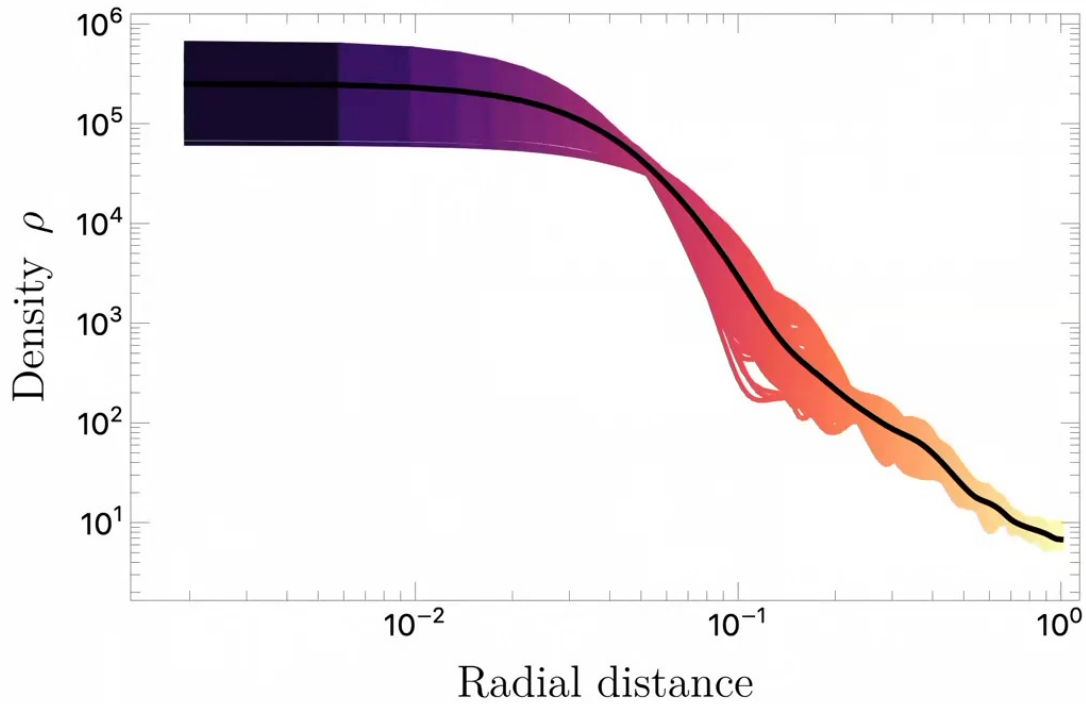
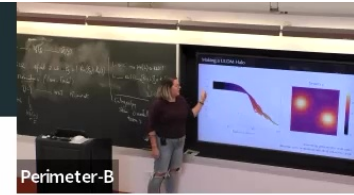


Density ρ



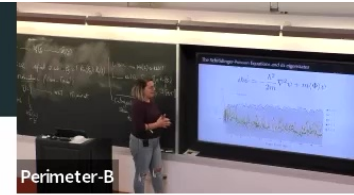
(Everything presented in code units)
(Because I do computation and don't believe in units)

Making a ULDM Halo

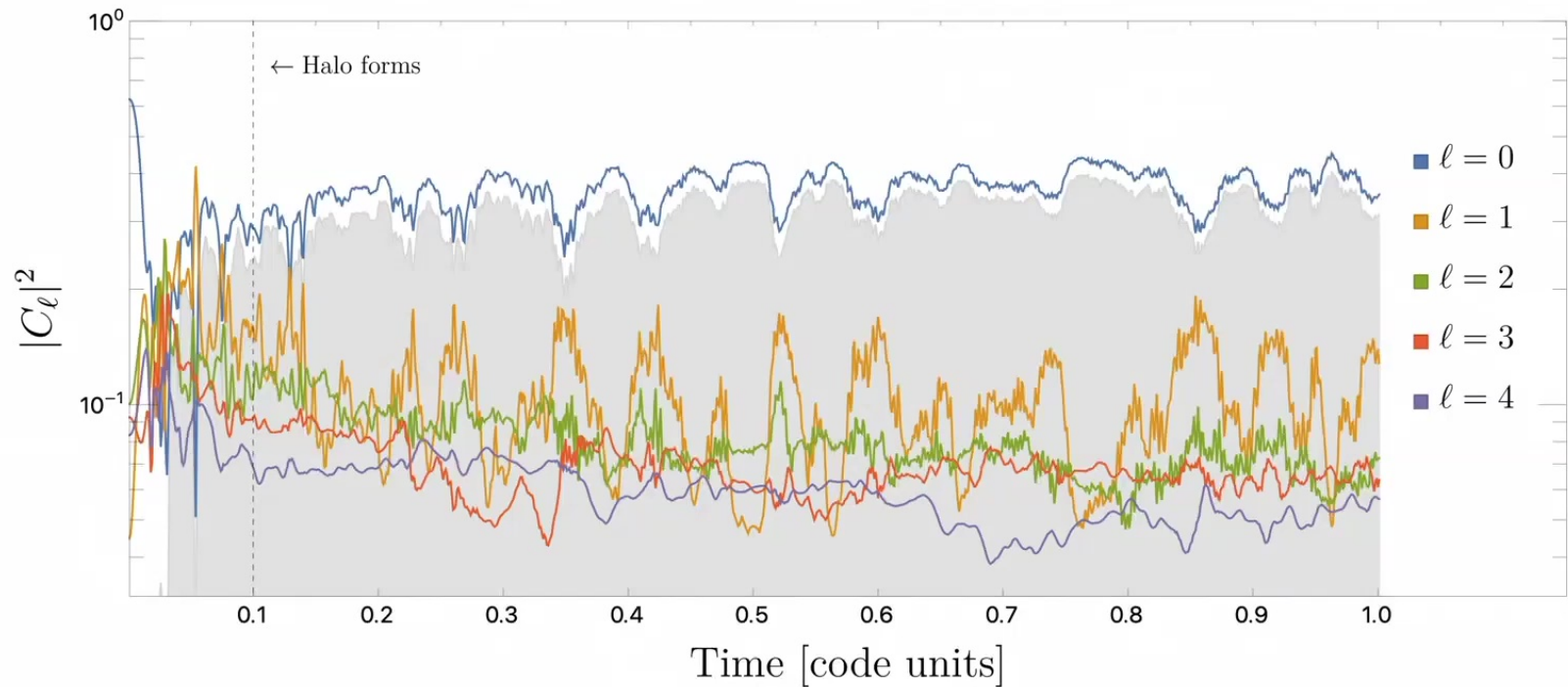


(Everything presented in code units)
(Because I do computation and don't believe in units)

The Schrödinger-Poisson Equations and its eigenstates



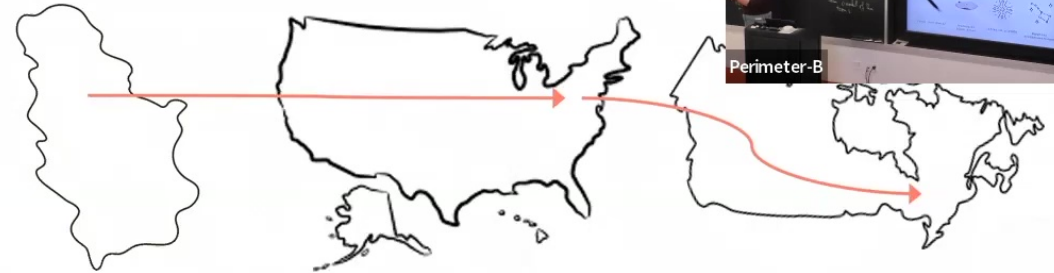
$$i\hbar\dot{\psi} = -\frac{\hbar^2}{2m}\nabla^2\psi + m\langle\Phi\rangle\psi$$



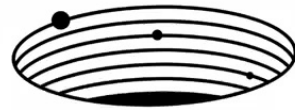
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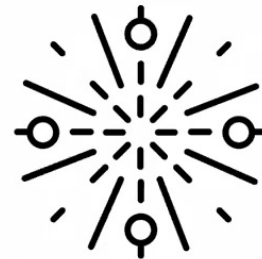
Cosmology



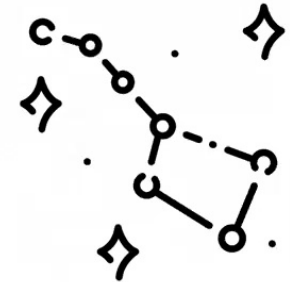
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