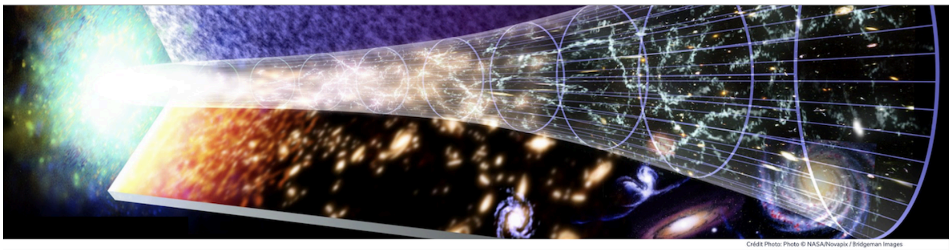

ID de Contribution: **18** | Type: **Non spécifié**

Vortices and rotating solitons in ultralight dark matter

mardi 15 avril 2025 14:50 (25 minutes)

The dynamics of ultralight dark matter with non-negligible self-interactions are determined by a Gross-Pitaevskii equation rather than by the Vlasov equation of collisionless particles. This leads to wave-like effects, such as interferences, the formation of solitons, and a velocity field that is locally curl-free, implying that vorticity is carried by singularities associated with vortices. Using analytical derivations and numerical simulations, we study the evolution of such a system from stochastic initial conditions with nonzero angular momentum. Focusing on the Thomas-Fermi regime, where the de Broglie wavelength of the system is smaller than its size, we show that a rotating soliton forms in a few dynamical times. The rotation is associated with a regular lattice of vortices that gives rise to a solid-body rotation in the continuum limit. We show that this configuration is a stable minimum of the energy at fixed angular momentum and we check that the numerical results agree with the analytical derivations.

Orateur: VALAGEAS, Patrick (IPhT - CEA Saclay)