

## AX-Gadget, a N-Body hydrodynamical code for axion cosmology simulations

*giovedì 26 ottobre 2017 17:30 (25 minuti)*

I am going to present a new module of the parallel N-Body code P-GADGET3, called AX-Gadget, that is able to perform cosmological hydrodynamical simulations with light bosonic non-thermal dark matter, often referred as Fuzzy dark matter (FDM). The dynamics of the FDM features a highly non-linear quantum potential (QP) suppressing the growth of structures at small scales. Previous attempts of FDM simulations either evolved suppressed initial conditions, completely neglecting the dynamical effects of QP throughout cosmic evolution, or resorted to numerically challenging full-wave solvers. AX-Gadget provides an interesting alternative, following the FDM evolution without impairing the overall performances. This is done by computing the QP acceleration through the Smoothed Particle Hydrodynamics (SPH) routines, with improved schemes to ensure precise and stable second derivatives. As an extension of P-GADGET3 code, it inherits all the additional physics modules implemented up to date, opening a wide range of possibilities to constrain FDM models and explore cosmic degeneracies. Toy model and cosmological tests will be presented and discussed, together with ongoing applications as Lyman-Alpha Forest constrain of FDM mass. Simulations will be compared with analytical predictions and results of other codes, validating the QP as a crucial player at small scales.

**Autori principali:** BALDI, Marco (BO); NORI, Matteo (BO)

**Relatore:** NORI, Matteo (BO)

**Classifica Sessioni:** Talks on Specific Topics - II