Contribution ID: **811** Type: **Talk in the parallel session**

Simulation-wise Comparison of Yukawa and Newtonian Gravitational Forces

Monday, 5 July 2021 18:30 (20 minutes)

In a cubic cosmological simulation box with three-dimensional periodicity, we determine the gravitational potential and force generated by a single particle. Using both the Newtonian approximation and Yukawa law of gravity within the cosmic screening approach [1,2], we zoom into the regions in the box where the distinction among them becomes significant. Extending the analysis to corresponding physical distances today as well as at late stages of matter domination, we show how employing Newtonian approximation over Yukawa gravity affects simulations of structure formation in terms of force computation. Additionally, we compare the plain Yukawa (non-periodic) and Yukawa-Ewald (periodic) forces in the box to study the impacts of periodic boundaries.

[1] M. Eingorn, First-order cosmological perturbations engendered by point-like masses. ApJ **825**, 84 (2016). arXiv:1509.03835.
[2] E. Canay, M. Eingorn, Duel of cosmological screening lengths. Phys. Dark Univ. **29**, 100565 (2020). arXiv:2002.00437.

Primary authors: CANAY, Ezgi (Istanbul Technical University); Dr EINGORN, Maxim (North Carolina Central University)

Presenter: CANAY, Ezgi (Istanbul Technical University)

Session Classification: Dark Energy and the Accelerating Universe

Track Classification: Dark Energy and Large Scale Structure: Dark Energy and the accelerating universe