



Contribution ID: 16

Type: not specified

# Improving dark matter halo catalogs for large scale structure using machine learning

*Friday 16 September 2022 09:45 (25 minutes)*

Our understanding of the Universe in its largest scales relies on our ability to accurately simulate the complexities of gravitational evolution, thus allowing us to test various cosmological models. Moreover, the increasing volume of the observations of our Universe and the nature of the targeted galaxies impose strong conditions on the size and mass resolution of these N-body simulations, thereby largely increasing the computational requirements past the tractability threshold. In order to mitigate the computational burden linked to large high-resolution (HR) simulations, we have developed a machine learning model that is able to increase the resolution of a low-resolution (LR) halo catalog by correcting the halo masses based on the relation of LR halos and their HR counterparts. The cost of our machine learning model is negligible compared to the cost of a real HR simulation; meaning the cost of obtaining a HR-like simulation is cut by a factor of  $\sim 8$ .

**Author:** FORERO SANCHEZ, Daniel Felipe (EPFL)

**Co-authors:** Dr ZHAO, Cheng (EPFL); Dr CHUANG, Chia-Hsun (KIPAC); Prof. YEPES, Gustavo (UAM); Dr RODRIGUEZ-TORRES, Sergio (UAM); Dr GOTTLÖBER, Stefan (AIP)

**Presenter:** FORERO SANCHEZ, Daniel Felipe (EPFL)