

Machine Learning In Astrophysics: Estimating Galactic Baryonic Properties from Their Dark Matter

Thursday, 7 November 2019 15:10 (20 minutes)

As astrophysics and cosmology deal with inherently “cosmological” sizes of data, machine learning is being rapidly adopted in a variety of astrophysical applications. In this talk, I will introduce a pipeline that estimates baryonic (visible) properties of a galaxy based purely on dark matter (DM; invisible) properties in large-scale DM-only simulations. It is shown that our pipeline promptly generates a galaxy catalogue from a DM halo catalogue using a machine trained on smaller-scale, fully-hydrodynamic, high-resolution simulations. An extremely randomized tree algorithm is used together with multiple novel improvements we developed such as a refined error function and two-stage learning. Our model may become a promising method to transplant the baryon physics of galaxy-scale hydrodynamic calculations onto a larger-volume DM-only run.

Presenter: Prof. KIM, Ji-hoon (SNU)

Session Classification: Invited talks - Physics and Astronomy 1-1