**Spring 2021**
**Sejong University**

# ADVANCED ASTROPHYSICS
**Prof. Graziano Rossi**

## CLASS PROJECT

**PROJECT 2 – Team 2:** 김신정, 권준, 홍성화

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## TITLE: "*Halos and Galaxies in Cosmological Hydrodynamical Simulations"*

## GOALS

Dark matter halos – the first virialized objects in the Universe – are the building blocks of structure formation and a key component of the cosmic web. The basic goal of this project is to identify dark matter halos in a small numerical simulation (which also includes gas besides dark matter), and study their main fundamental properties (i.e. shapes, profiles, ect. )

## WORK PLAN

- Consider the provided Gadget snapshots, at a given redshift
- Read Gadget snapshot & make some visualization plots
- Run the Rockstar halo finder on the simulation snapshot
- Find halos and compute all the statistics & profiles & shapes
- Run a galaxy finder on the same simulation snapshots
- Find galaxies and characterize basic galaxy properties
- Compare halo finders too (Rockstar vs Velociraptor)
- Discuss the importance in cosmology of this type of study

## TOOLS

- Gadget Simulation snapshots → provided in class
- Pygadget or a gadget reader
- Python
- Rockstar → https://bitbucket.org/gfcstanford/rocksta
- Velociraptor → https://velociraptor-stf.readthedocs.io/en/latest/

## REQUIREMENTS

- Final Class Group Presentation
- Final paper/writeup