NewHorizon: the galaxy structure decomposition - photometry vs. kinematics

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Abstract

Stellar components of galaxies have been considered as complex systems, evolved with varous kinds of evolutionary processes.
In observation, the decomposition of the galaxy structure is done using mathematical models such as the Sersic profile.

But recent cosmological hydrodynamic simulations have suggested that the photometrically decomposed structures are not perfectly matched with the kinematically decomposed structures.

Therefore, we aim to look at how much difference there is between the components identified in observations and simulations and what is the main driving factor for this difference to provide a more accurate interpretation of observations.

Using NewHorizon, a cosmological simulations with a high spatial resolution (_˜40pc), the kinematic decomposition is performed using gaussian mixture model (GMM) in phase space with Jz/Jcir, Jp/Jcir, and —e/e_max—, and the photometri decomposition is conducted using mock images of the NewHorizon galaxies generated by a radiative transfer code, SKIRT. We find that there's a significant offset between kinematic D/T and photometric D/T of the galaxies and this differences is much significantly bigger in low mass galaxies. We also discover the diverse and complex structures of spheroidal components of the galaxies and confirm that further research is required to analyze the spheroidal component structure more precisely.

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