

Application for an oral contribution to the 2024 SF2A session:
"02 Simulating galaxies: from stellar to cosmological scales"

Title:

Flows around galaxies: I. The dependence of galaxy connectivity on cosmic environments and effects on the star formation rate

Authors:

Daniela Galárraga-Espinosa (presenter), Enrico Garaldi, Guinevere Kauffmann

Abstract:

How galaxies acquire their material to form stars is still not well understood. With the goal of bringing substantial insight to this fundamental question, I will present a comprehensive characterisation of the galaxy connectivity (i.e., the number of kpc-scale filamentary streams connected to a galaxy) in relation to the cosmic web environment. I will present the statistical results obtained by analysing the streams around ~3000 central galaxies at the peak of star formation activity ($z \sim 2$), in the TNG50 simulation. These small-scale filaments were detected using DisPerSE on the surrounding (local) dark matter density field. Besides the expected trends with mass, I will show that galaxy connectivity depends on other factors such as the galaxy's local density, and position within the cosmic web. Finally, I will demonstrate the impact of these streams on the galaxies' SFR, and show the importance of considering the large-scale matter reservoirs and the anisotropic tidal field to better understand galaxy evolution.

Link to the paper:

<https://www.aanda.org/articles/aa/pdf/2023/03/aa44935-22.pdf>