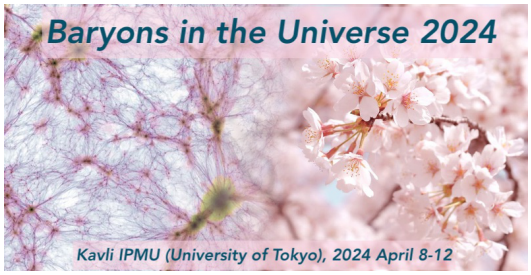

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Interactions of galaxies and their gas reservoirs from local halos to the cosmic web

Friday, 12 April 2024 14:00 (25 minutes)

The interconnectedness among galaxies, their circumgalactic media (CGM), and the intergalactic medium (IGM) that permeates the cosmic web has come in ever sharper focus, as it is now clear that star formation and the enrichment of heavy elements critically depends on the exchange of matter and energy from one to the other. I will present results from the observational perspective highlighting these dependencies from galaxy to halo to cosmic web scales leveraging ultraviolet, optical, and 21 cm tracers of star formation and multi-phase gas reservoirs. On the largest scales, my team developed the Monte Carlo Physarum Machine (MCPM), inspired by the physarum polycephalum slime mold organism, to reconstruct the cosmic web from discrete galaxy tracers. We have combined these reconstructions with both QSO spectra and fast radio bursts to characterize how the ionized plasma of the IGM depends on large-scale structure environment. On halo scales, I will demonstrate how the star formation, cold gas in the ISM (from 21cm HI measurements), and CGM gas contents (from the UV) depend on the mass of the host group or cluster halo and the location of the galaxy within the halo. Finally, I will give a first look at results from the SDSS-V eROSITA clusters follow-up program that combines the widest and deepest X-ray perspective ever on the hotter phase that is ultimately responsible for quenching in the most massive halos, enabling us to study both quenching and cooler gas reservoirs on group and cluster scales over a large swath of cosmic time.

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