



COLLOQUIUM

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4pm Workman 101

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

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 (UV), 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. Lastly, I will highlight a science case to observe the CGM in UV emission we developed in the CGM/IGM working group for Habitable Worlds Observatory.