ASTROPHYSICS SEMINAR SERIES

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STScI

Tuesday, February 11 12:30 pm - Rm 184 NSH

Characterizing and mapping the circum-galactic medium

Gas flows in and out of galaxies are poorly constrained and understanding these processes is crucial to studies of galaxy evolution. Observations of the Circum-Galactic Medium (CGM), where these processes take place, are therefore essential for making progress in understanding gas flows but remain challenging as this medium is intrinsically thin and very faint. The most efficient approach to detect this faint and diffuse gas is in absorption towards bright background quasars. However, to investigate the CGM we need to also identify the galaxy counterpart and connect it to the absorption feature. In this context we combined ground-based IFU SINFONI data with high-resolution HST imaging to detect and characterize the counterparts to Damped Lyman-alpha Absorbers (DLAs) at z~1. We measured their stellar masses and find them to be generally less massive than the average galaxy population. We also discovered their complex morphology and found an apparent anti-correlation between their stellar mass and the HI column density of the DLA.

While absorption lets us investigate faint gas, it is usually limited to a single line of sight and we need observations in emission to fully map the CGM and gain information on its extent and spatial structure. However, such observations are challenging with current facilities. To improve observing strategies, we have made CGM emission predictions from dedicated cosmological zoom-in simulations. We post-processed galaxy halos with a photoionization model to create mock IFS observations. Using them as input for the instrument models of current and future space and ground based facilities (e.g. ELT), we assess the feasibility of future CGM observations and optimize observing strategies.

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