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PHYSICS AND ASTRONOMY SEMINAR

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The evolution of cold accretion flows in the CGM of massive galaxies and proto-clusters at z>2

Massive star-forming galaxies and proto-clusters at high redshift, z>2, are thought to be fed by narrow streams of cold, ~10^4K, gas from cosmic web filaments. However, the interaction of these cold streams with the ambient hot CGM is poorly understood. In particular, the observational signatures of this interaction and of cold streams more broadly, the thermal and morphological state of the gas that eventually reaches the central galaxy, and its effect on galaxy evolution, are all open questions. I will present the latest results from a systematic study of this interaction, using a combination of analytic models, idealized high-resolution numerical simulations, and cosmological simulations. We study the effects of hydrodynamics, radiative cooling, self-gravity, the halo potential, and magnetic fields, separately and together, in order to gain insight into stream evolution in different limits. We find that while hydrodynamic instabilities can disrupt streams in the CGM, these are stabilized by cooling, gravity, and MHD. Radiative cooling in the turbulent mixing layer between the stream and the CGM is observable in Lyman alpha, and can explain several observed Lyman alpha blobs. Self-gravity in the streams can lead to star-formation in the CGM at redshifts z>~4. MHD effects lead to magnetically dominated interface regions which appear out of thermal pressure equilibrium and impact the phase structure of the high-z CGM.

Wednesday, June 30, 2021

10:00 a.m. PST

For more information: https://www.sfu.ca/~jwa304/seminars.shtml