Instabilities in cold streams feeding massive galaxies at high redshift

Massive star-forming galaxies at redshift z>1, during the most active phase of galaxy formation, were fed by cold streams of dense gas flowing along the filaments of the cosmic web. These streams penetrate through the hot halo, encompassed by a stable shock at the virial radius, and make their way towards the central galaxy. On their way, they are subject to numerous instabilities which can affect their morphology, induce fragmentation, and lead to the emission of observable radiation. I will discuss the evolution of cosmic cold streams and their interaction with the CGM at various redshifts, using both analytic models and idealized simulations. We find that for a large region of the streams' parameter space, Kelvin-Helmholtz instabilities can lead to stream disruption in less than a virial crossing time. Additionally, gravitational instabilities can lead to the formation of bound clumps in the streams with typical masses of up to 10^8 Msun. At z>5, these objects can cool and form stars with metallicities as low as ~1% solar, potentially leading to the formation of metal-poor globular clusters in the halos of massive galaxies. The latter prediction of globular clusters forming along filaments in galactic halos can be tested with upcoming JWST observation.