The Gestalt Survey: Studying the cosmic noon Universe as a whole from the cosmic web to galaxies using MOSAIC on the ELT

Matthew Pieri (Laboratoire d'Astrophysique de Marseille)

The star formation rate of the universe peaks at z~2; an era known as `cosmic noon'. The build-up to cosmic noon is a key and poorly studied part of the history of the universe. At this epoch streams of gas and dark matter from the cosmic web feed the formation of most stars we see today, while galaxies simultaneously drive outflows back into their environments in response. Low mass galaxies, with their shallow dark matter potential wells, are particularly critical sources and sinks in this feedback loop, since they are the most numerous and continually exchange matter with their environments. Thus far it has neither been possible to study these processes on any scales, nor to establish the distribution of matter at that epoch. The MOSIAC Science Working Group 2 (Inventory of Matter) intend to confront this challenge.

The universe must be understood as an interconnected whole rather than simply by its constituent parts, and therefore the overarching goal of this programme is to study *matter from the largest scales down to galaxies* in a common cosmological volume (CCV) to explore the drivers of galaxy formation. More specifically, we will *i) map the cosmic web using intergalactic medium tomography spanning cosmological scales and resolving the dark matter halo scale (the so-called circumgalactic medium), ii) study physical conditions and metal abundances of gas in absorption, iii) probe gas emission close to galaxies, iv) study ionised gas kinematics, dark matter distributions and other properties of galaxies, and v) explore how ii-iv depend on cosmic web environment.*