Clumpy star formation in the z~1 "Cosmic Snake" (MACS1206arc).

Antonio Cava[1], Daniel Schaerer[1], Miroslava Dessauges-Zavadsky[1] and the HLS collaboration
[1]*Geneva observatory, University of Geneva, Switzerland*

In the last few years, an increased fraction of irregular rest-frame UV morphologies was noted among galaxies at redshifts z = 1—3. Observations of the galactic internal structure suggest that a substantial fraction of z~1—2 bright star-forming galaxies are dominated by ordered disk rotation. These high-redshift disks appear as gas-rich, clumpy, and highly turbulent (marginally instable) rather than smooth, rotationally supported disks with negligible turbulence as observed in present-day galaxies. A picture has emerged in which star-forming, kiloparsec-scale clumps are, for the majority, gravitationally bound structures produced by disk fragmentation as a result of the Toomre instability, likely triggered by the continuous accretion of cold gas flow. To shed more light on the nature of these star-forming clumps and set constraints on their formation and evolution scenarios urgently calls for accurate measurements of physical properties of clumps, such as stellar mass, age, star formation rate, star formation history, molecular gas mass, gas depletion timescale, size, and kinematics. Very few pioneering works have explored this technique so far. In our multi-wavelength Lensing Survey of massive galaxy clusters aiming to detect z =1—6 lensed background galaxies, we detect the striking, elongated, strongly-lensed galaxy arc at z = 1.036 in the cluster MACS1206-0848. Named the "Cosmic Snake", optical and NIR high-resolution HST images reveal a spectacular clumpy structure, offering a rare opportunity for a detailed study of giant clumps in a z~1 galaxy. Using the wide database of ancillary photometric data at hand from UV to far-IR we derive meaningful SEDs and constrain the physical properties for the clumps resolved in the Cosmic Snake at sub-kiloparsec scales.