Colloquium

SFB 956

Conditions and Impact of Star Formation

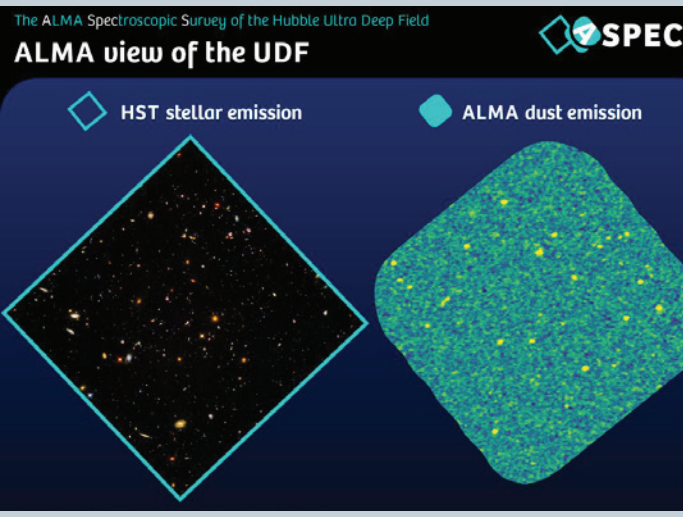
7 October 2021

Monday 1 p.m.

Physikalische Institute Köln

Video stream

supplementary colloquium



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Constraining the Cosmic Baryon Cycle with ALMA

New observations with ALMA have provided a census of the density of molecular gas in the cosmic volume defined by the Hubble Ultra-Deep Field. This molecular gas density shows an order of magnitude decrease as a function of redshift from z~2 to z=0. It follows, to first order, the dependence of the cosmic star formation rate density. This is markably different from the atomic gas phase that shows a rather flat redshift dependence. At low redshift, observations of the interstellar medium of nearby galaxies (in particular the HERACLES survey of molecular gas and the THINGS survey of atomic hydrogen) have demonstrated that the atomic gas is significantly more extended than the molecular gas (the latter being tightly correlated with star formation activity). A similar picture is also emerging in observations of high-redshift galaxies. Assuming a simple galaxy model based on these findings, and using other measurements from the literature, the ALMA Hubble Ultra-Deep Field data are used to put observational constraints on the gas (net) accretion flows in galaxies. These gas flows are needed to explain the build-up of the stellar mass in galaxies, and are further compared to cosmological galaxy formation simulations.