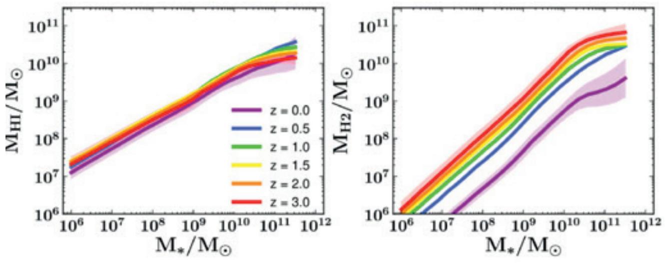
Colloquium

SFB 956

Conditions and Impact of Star Formation

04.12.2015 | supplementary colloquium
Friday 11:00 am

Max-Planck-Institut für Radioastronomie
Auditorium 0.02
Auf dem Hügel 69 | 53121 Bonn



The image shows the evolution of the HI and H_2 mass of galaxies as a function of their stellar mass as predicted by a data-driven model. Note that there is hardly any evolution in the relation between HI mass and stellar mass, whereas the relation between H_2 mass and stellar mass drops over an order of magnitude during the same cosmic epoch.

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The HI and H_2 Gas Content and Sub-mm Line Emission of Galaxies over Cosmic Time

The star-formation activity of our Universe increased from early epochs (z~6), peaked around z=2, and then decreased by an order of magnitude until present age. To fully appreciate the physical origin of the star-formation activity of our Universe we need to focus on the gas content of galaxies over cosmic time. The most recent versions of cosmological models of galaxy formation explicitly include the detailed tracking of the atomic and molecular hydrogen content of galaxies and make predictions for the sub-mm lines emission from species such as CO, HCN, [CII]. New semi-empirical approaches provide data-driven predictions for the atomic and molecular gas content of galaxies. I will discuss the predictions made by these different types of models for the HI and H_2 content of galaxies and their sub-mm line emission. These predictions include a weak evolution in the HI content and HI mass function of galaxies, strong evolution in the H_2 content of galaxies, the weak evolution in the cosmic density of HI, the evolution of atomic and molecular gas in dark matter haloes, CO SLEDs of galaxies over cosmic time, and predictions for CO luminosity functions. I will compare these predictions to current observational samples, discuss future observing strategies, and will also demonstrate how the combination of cosmological and semi- empirical models can help to reveal caveats in our understanding of galaxy formation.

I will finish by showing our recent efforts to couple cosmological zoom-in hydro simulations with a radiative transfer code to model the emission and distribution of different CO rotational transitions in main-sequence galaxies at z=2.

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