

Cosmology Seminar

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Ten Billion Years of Chemical Evolution in Star-Forming Galaxies

Local star-forming galaxies obey a striking correlation between stellar mass and metallicity spanning five orders of magnitude in mass and a factor of 300 in metallicity. The gas-phase metallicity of a galaxy reflects its integrated star formation history, modulo inflows and outflows of gas and metals; therefore, the mass-metallicity relation, and its evolution with redshift, serves as a powerful metric of galaxy evolution. We have measured the mass-metallicity relation at $.01 < z < 0.8$ using spectrophotometry of ~ 5000 I-band selected galaxies observed as part of the AGN and Galaxy Evolution Survey. We find that the mean metallicity of luminous star-forming galaxies has increased by $< 15\%$ since $z \sim 0.8$, indicating that the bulk of their metals (and therefore stars) were synthesized at $z > 1$. However, we have identified an intriguing population of luminous/massive metal-poor galaxies at $z \sim 0.7$ that must trace a much more rapid chemical enrichment history to reach the present-day mass-metallicity relation. Finally, I compare these results to observations of star-forming galaxies at $z = 1-2$, and discuss the challenges of extending metallicity measurements to lower mass/luminosity and higher redshift.

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12:10 PM – Room 416 PHY/GEO