

Colloquium

SFB 956

Conditions and Impact of Star Formation

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[Video stream](#)

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Probing the Stellar Initial Mass Function with CNO Isotopes

All measurements of cosmic star formation and stellar mass must assume the stellar initial mass function (IMF) to extrapolate from massive stars to total. Traditional determinations of the IMF in galaxies are made at ultraviolet, optical and near-infrared wavelengths, which cannot be probed in dusty gas-rich galaxies. The C-13/O-18 abundance ratio in the ISM – which are produced mainly by low-and-intermediate-mass stars and massive stars, respectively -- has been demonstrated as a sensitive index of the IMF in gas-rich galaxies. Besides the C-13/O-18 ratio, which is associated with different elements, O-17 and O-18 are likely even more sensitive to the IMF. Here we will present new ALMA observations and archival data of ^{17}O and ^{18}O in nearby galaxies. A systematic trend of $^{17}\text{O}/^{18}\text{O}$ ratios from starbursts to dwarf galaxies implies that a variable IMF is inevitable. At the end, we will present recent benchmarking on the CNO isotope gradient of the Milky Way, extending to the low-metallicity outer region.