Dust-to-Gas Ratios in Early-type Galaxies

A. F. Crocker (University of Massachusetts Amherst), L. M. Young (New Mexico Tech), P. Serra (ASTRON, Netherlands), J. Donovan Meyer (Stony Brook University), M. Bureau, (University of Oxford, United Kingdom), Atlas3D Team

We present dust-to-gas ratios for all possible galaxies of the Atlas3D early-type galaxy sample, using IRAS measurements to constrain the dust mass. Cold gas masses are combined molecular and atomic masses, determined from single-dish CO and interferometric HI measurements obtained as part of the Atlas3D survey. Many early-type galaxies exhibit high dust-to-gas ratios (above that of the Galaxy) and thus likely have a high metal-content ISM. However, a few have much lower dust-to-gas ratios, signaling the acquisition of their gas from a lower-metallicity source. Additionally, using higher-sensitivity Herschel data for 3 galaxies with outer HI distributions, we present dust-to-gas ratios for these galaxies. Two of these three galaxies have extremely low dust-to-gas ratios with only upper limits on their dust masses, despite the sensitivity of Herschel. Little dust thus exists in these outer distributions of HI, either dust destruction is rapid in these environments or the ISM is very deficient in the metals required to form dust.