

Evolution of Grains in the Magellanic clouds (ENIGMA)

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We present preliminary results from our dust evolution modeling of the Large Magellanic Cloud (LMC) and Small Magellanic Cloud (SMC). Despite the many manifestations of dust in galaxies, its nature, origin, and evolution are still poorly understood. The LMC and SMC are ideal astrophysical laboratories to study the lifecycle of dust in galaxies, because all stars and ISM clouds are at a similar distance, rendering masses and luminosities directly comparable. Moreover, their proximity permits detailed studies of the stars and their relation to the ISM dust from local to galaxy wide scales. Their subsolar metallicities permit investigations on how dust evolution depends on metallicity.

Using the results from the Spitzer Surveying the Agents of Galaxy Evolution (SAGE) surveys and HERschel Inventory of The Agents of Galaxy Evolution (HERITAGE) surveys of the LMC and SMC, we can quantify some key aspects of the dust lifecycle in these galaxies. In particular, the infrared and submillimeter emissions are effective tracers of the interstellar medium (ISM) dust, the embedded young stellar objects (YSOs) and the dust ejected by dying stars. We use the theoretical framework developed by Dwek et al. (1998) to develop the dust evolution models. We have further constraints from prior work on the star formation histories, stellar content and metal abundance measurements.