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Systematics in dust emission modeling in nearby galaxies

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The dust properties of nearby galaxies are often inferred by modeling their infrared (IR) spectral energy distributions (SEDs), using dust grain models. These are created with a simplified radiation model, with assumptions on the intensity and hardness of the radiation field.
Using the Draine & Li (2007; DL07) dust model, we create a set of synthetic dust emission SEDs with a 3D radiative transfer (RT) model (DIRTY; Gordon et al. 2001), taking into account absorption, scattering and stellar and dust emission, in various galactic environments (varying the dust and stars distribution, star formation history, metallicity and dust mass). We use the DL07 models to fit these synthetic SEDs, and estimate the systematic biases due to the difference in the dust heating treatment.
We find that the empirical description (a power-law) of the radiation field heating the dust may lead to over- (when a dust layer surrounds stars) and underestimation (when dust is embedded in a cluster of stars) of dust properties such as total mass, or PAH fraction. We quantify these errors by comparing the RT-calculated radiation field and the empirical approach, showing that the power-law description is not suited for all cases.

Consider for a poster?

Yes

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