



Publication Year	2021
Acceptance in OA	2022-03-29T09:12:25Z
Title	A nearby galaxy perspective on dust evolution. Scaling relations and constraints on the dust build-up in galaxies with the DustPedia and DGS samples
Authors	Galliano, Frédéric, Nersesian, Angelos, BIANCHI, SIMONE, De Looze, Ilse, Roychowdhury, Sambit, Baes, Maarten, CASASOLA, VIVIANA, Cassará, Letizia P., Dobbels, Wouter, Fritz, Jacopo, Galametz, Maud, Jones, Anthony P., Madden, Suzanne C., Mosenkov, Aleksandr, Xilouris, Emmanuel M., Ysard, Nathalie
Publisher's version (DOI)	10.1051/0004-6361/202039701
Handle	http://hdl.handle.net/20.500.12386/31987
Journal	ASTRONOMY & ASTROPHYSICS
Volume	649

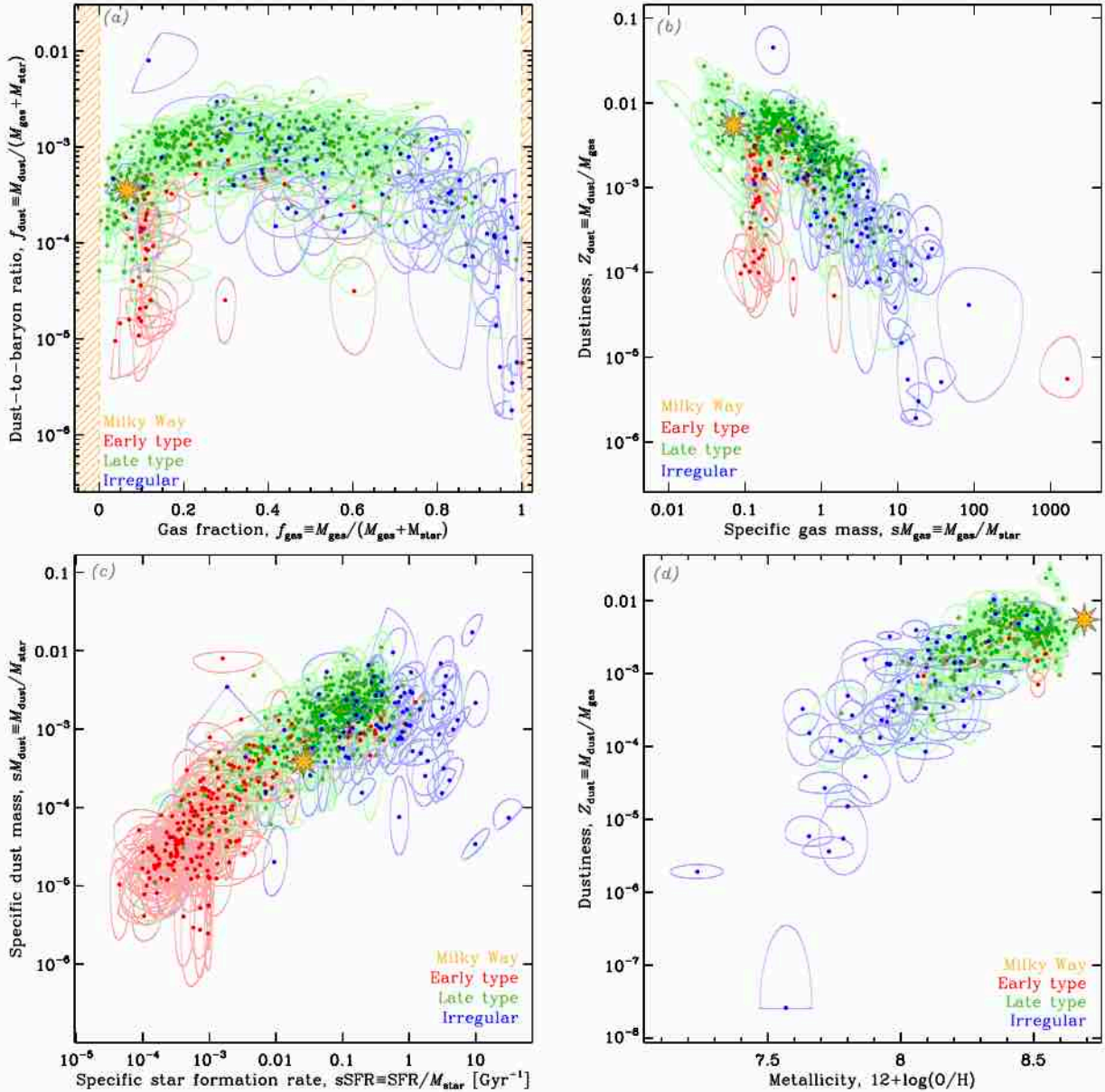


Fig. 8. Dust-related scaling relations. In the four panels, the SUEs represent the posterior of each galaxy, using the reference run (Sect. 3.2). The SUEs are color-coded according to the Hubble stage of the object (Sect. 3.3). We show the Milky Way values, as a yellow star, for comparison. We emphasize that, although we are showing different parameters of the same sample, the different panels do not exactly contain the same number of objects (Table 2). In particular, there are fewer reliable metallicity measurements, especially for ETGs.

These would occupy the high-metallicity regime. Compared to Rémy-Ruyer et al. (2014), who presented a similar trend for the DGS sources, we notice that a few sources are missing and some metallicities have been updated. This comes from the fact that we have adopted the more robust DGS metallicity reestimates by De Vis et al. (2017a), with published nebular lines and using the PG16_S calibration (Sect. 2.2.2). The lowest metallicity source, at $12 + \log(\text{O}/\text{H}) \approx 7.15$, is IZw 18. The most dust-deficient source of the panel, at $Z_{\text{dust}} \approx 1.9 \times 10^{-6}$, is UGCA 20. It is a clear outlier to the trend with $\text{CR}_{95\%}(Z_{\text{dust}}) = [1.3 \times 10^{-6}, 3.0 \times 10^{-6}]$.

4.1.2. Comparison to X-ray luminosities

The ETG outliers, visible in panel b of Fig. 8 and discussed in Sect. 4.1.1, are likely due to enhanced dust destruc-

tion by thermal sputtering in their hot, X-ray emitting gas (e.g., Bocchio et al. 2012; Smith et al. 2012), as suggested by De Vis et al. (2017b). We could conceive a reverse causality where it is the low dust abundance that allows a higher fraction of escaping X-ray photons. However, this is unrealistic, as X-ray observations clearly indicate that ETGs are permeated by a coronal gas that is usually not found in later types of galaxies (Mathews & Brighenti 2003, for a review). In order to support the likeliness of the thermal sputtering scenario, we have compiled X-ray luminosities from the literature (Table 4). Figure 9 displays the dust-to-stellar mass ratio as a function of the X-ray photon rate per dust grain, L_X / M_{dust} , for the 256 galaxies in our sample with published X-ray luminosities. This figure shows a mild negative correlation between the two quantities, consistent with the enhanced dust destruction in X-ray-bright