Spatial distributions of dust in dusty galaxies at $z \sim 1$

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Do spatial distributions of dust grains in galaxies have typical forms, as do spatial distributions of stars? We investigate whether or not the distributions resemble uniform foreground screens, as commonly assumed by the high-redshift galaxy community. We use rest-frame infrared, ultraviolet, and Hα line luminosities of dust-poor and dusty galaxies at $z \sim 0$ and $z \sim 1$ to compare measured Hα escape fractions with those predicted by the Calzetti attenuation formula. The predictions, based on UV escape fractions, overestimate the measured Hα escape fractions for all samples. The interpretation of this result for dust-poor $z \sim 0$ galaxies is that regions with ionizing stars have more dust than regions with nonionizing UV-emitting stars. Dust distributions for these galaxies are nonuniform. The interpretation of the overestimates for dusty galaxies at both redshifts is less clear. If the Calzetti attenuation formula is inapplicable to these galaxies, perhaps the disagreements are unphysical; perhaps dust distributions in these galaxies are uniform. If the attenuation formula does apply, then dusty galaxies have nonuniform dust distributions; the distributions are more uniform than they are in dust-poor galaxies. A broad range of Hα escape fractions at a given UV escape fraction for $z \sim 1$ dusty galaxies, if real, indicates diverse dust morphologies and the implausibility of the screen assumption.