

30 Years of Photodissociation Regions:

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The Herschel Dwarf Galaxy Survey: Gas properties at low metallicity

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I will present recent results on the gas properties of the galaxies from the Herschel Dwarf Galaxy Survey. In low-metallicity environments, molecular tracers are rare and the far-IR lines, detected down to metallicities of 1/40th solar thanks to Herschel, may be our best handle on their star formation properties.

We analyze observations of the mid-IR and far-IR cooling lines together with detailed Cloudy spectral synthesis models to characterize the physical conditions in the ISM of those galaxies. We find that the low-metallicity ISM differs dramatically from that of more metal-rich objects. It is characterized by harder radiation fields and a porous structure, with larger filling factors of ionized gas, the [O III] 88 μ m line being the brightest far-IR line. The C+ emission arises mostly from PDRs, which are dense, of low covering factors, and have moderate UV field strengths. The high [C II]/ L_{TIR} and [C II]/CO ratios also suggest efficient photoelectric heating caused by UV field dilution and strong effects of photodissociation, leaving a possibly large reservoir of CO-dark gas in those dwarf galaxies.

REFERENCES

Cormier, D., Madden, S. C., Lebouteiller, V., et al. (2015) A&A, in press.