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Chemical enrichment in local galaxies as probed by star-formation driven outflows

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Galactic feedback driven by massive stars and active galactic nuclei (AGNs) plays a fundamental role in regulating galaxy evolution. Galaxies are filled with chemical elements and dust, released in their interstellar medium through different channels, e.g., supernova explosions, stellar winds. However, intense starburst episodes could generate strong outflows able to suppress star formation (SF) and to expel large amount of dust and metals out of the galaxies, enriching their circum (or even inter) galactic media. Therefore, the balance between the production and removal of such galactic components is of key importance to determine the fate of a galaxy. Although galactic outflows are common in high-redshift star-forming galaxies (SFGs) and quasars, local dwarf galaxies are particularly sensitive to feedback processes and offer a unique opportunity to study these phenomena in great details. Furthermore, efficient outflows are predicted by state-of-the-art chemical evolution models in such galaxies, in order to reproduce their observational properties. To test these expectations, we looked at outflow signatures in a sample of $\sim$ 30 local dwarf SFGs as part of the Dwarf Galaxy Survey. We made use of spectroscopic Herschel/PACS archival data to search for atomic outflows in the broad wings of observed [CII]158 μm line profiles. We found that SF-driven outflows are typically less efficient than those from local AGNs, with mass-loading factors (i.e., the ratio between the outflow mass and star formation rate) slightly greater than unity. However, these findings could be underestimated up to a factor $\sim$ 3 when accounting for the molecular and ionized gas phases. Direct constraints on the outflow efficiency in removing dust and metals from these sources are fundamental for a correct tuning of chemical models, in order to obtain new insights on the processes ruling the dust and metals growth and destruction in the interstellar medium of galaxies.

Session

Galactic Chemical Evolution

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