APEX and NOEMA observations of H2S in nearby luminous galaxies and the ULIRG Mrk 231

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In order to understand the evolution and feedback of Active Galactic Nuclei (AGN) and star formation it is important to use molecular lines as probes of physical conditions and chemistry. Such emission can be used to study important physical processes such as massive outflows powered by the nuclear activity in the centre of galaxies (e.g., [1] [2] [3] [4] [5] [6] [7] [8]). Nonetheless, the life-cycle of the molecular gas is still not well understood. Particularly, one point that remains poorly explored is the relationship between the properties of the dense gas and those of the molecular outflows. To understand the origin of the dense gas in outflows, tracers that probe specific physical and chemical conditions are required.

We present results from APEX and NOEMA observations of the 1_{10}–1_{01} transition of ortho-H_2S at 168 GHz towards the centres of thirteen nearby luminous infrared galaxies (LIRGs). We found that the outflow mass correlates stronger with the line luminosity of H_2S and of other dense gas tracers than with that of the CO, which corresponds to the global molecular gas of the galaxy [9]. We suggest that L_{H2S} serves as a tracer of the dense gas content, similar to L_{HCN}, and that the correlation between L_{H2S} and $M_{\mathrm{outflow}}(\mathrm{H_2})$ implies a relation between the dense gas reservoir and the properties and evolution of the molecular feedback. This potential link requires further study since it holds important keys to our understanding of how the properties of molecular outflows relate to those of their host galaxies.

We will also present preliminary results of high angular observations of H_2S with ALMA towards a group of the LIRGs that were observed with APEX.

References

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