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Federico Esposito - Modelling molecular clouds and CO excitation in AGN-host galaxies

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The molecular phase of the interstellar medium (ISM) is the birthplace of stars, hence it plays a central role in the evolution of galaxies. It is also one of the main sources of accretion and obscuration for active galactic nuclei (AGN). Stars and AGN, in turn, excite the molecular gas in galaxies in a feedback process. I will present how we can study the AGN feedback at mm/sub-mm wavelengths from observations of carbon monoxide (CO) emission lines. On a new sample of local active galaxies, we inferred the contribution of far-UV radiation from stars, and X-ray radiation from the AGN, respectively producing photodissociation regions (PDRs) and X-ray dominated regions (XDRs), to the molecular gas heating. Following this, we worked a new physically-motivated model for estimating the molecular line emission in active galaxies, which takes into account the internal density structure of giant molecular clouds (GMCs), the radiative transfer of PDRs and XDRs, and the mass distribution of GMCs within galaxies. By comparing the model results with CO observations, we are able to put constraints to the relative importance of AGN and stellar radiative feedback.

Session Classification: Local Universe