

# Impact of AGN activity on the molecular content of galaxies

Jorge Cuadra  
Institute of Astrophysics, Pontificia Universidad Católica de Chile

Di Li  
National Astronomical Observatories of China, Chinese Academy of Sciences

*Keywords: AGN, Molecular Clouds*

Molecular clouds (MCs) are the birth places of stars and planets. They also foster an environment suitable for synthesizing the ingredients that are important for life. For example, water and many organic molecules have been detected in MCs. It is known that the chemical reactions of complex molecules can be catalyzed by a sufficient dose of ionizing radiation. For this reason, an active galactic nucleus (AGN), by emitting ionizing photons and cosmic rays, could potentially enhance the production of complex molecules in its host galaxy. Since almost all big galaxies host supermassive black holes, which must have attained their masses during the AGN episodes, the molecular content of big galaxies in principle should bear imprints of previous AGN activities.

However, not all MCs could survive during the AGN phase. At a close distance from an AGN, a MC could have been photo-evaporated by the strong irradiation, the molecules would be disassociated by the ionizing photons, and the entire cloud may be unstable and subject to disruption due to the strong external pressure in the AGN environment. As a result, the "habitable zone" for MCs, in theory, should be restricted to the outer part of a galaxy, or in the galactic disk where the high gas density could provide sufficient shielding against the radiation from the central AGN. On the other hand, observations would elucidate this matter by directly mapping the spatial distribution of molecular material inside galaxies.

This project aims at understanding the relationship between AGN activity and the distribution, abundance, and diversity of molecules in galaxies. The results would be of particular interest to the ALMA community. We expect the prospective postdoc fellow, either a theorist or an observer, to contribute his/her own expertise and collaborate with the hosts to investigate problems within the context of this research topic.