Modelisation of the PDR in the HII region W49N

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The W49N HII region is one of the most luminous regions of active star formation in the Galaxy. We performed ISO-LWS observations of the [OI] (63μm and 145μm) and [CII] (158 μm) lines seen in emission and the OH (119 μm, 53 μm and 84 μm) lines seen in absorption towards this region. We also used CO and its isotopes in the first two transitions, which are observed in the same beam than the LWS one.

We first used an LVG model in order to reproduce the different fluxes in those lines and estimate physical parameters like column densities, temperature and densities. The cooling lines in this region present anomalously low heating efficiency and 63/157 ratio suggestive of an inhomogeneous medium. Furthermore, the geometrical complexity of this source, with 7 distinct ultra-compact HII regions powered by O5-O8 stars in the W49N core surrounded by 3 distinct molecular clouds, requires the use of models more sophisticated than face-on plane-parallel slabs ones. Such PDR models have been developed (Spaans & van Dishoeck 1997) and used in our case in order to determine the physical conditions in this clumpy medium.

We will present a comparison of the intensities in the lines with many similar region to determine how much is the HII region W49N an extreme source. Finally, new observations with a higher sensitivity and spectral resolution that will be attain by the 3 focal plane instruments of FIRST are clearly needed in order to probe the physics, kinematics and energetics of star forming regions through their cooling lines.