# Herschel/HIFI Observations of Extra-Ordinary Sources: The physical and chemical structure of the Orion Bar

Zsofia Nagy (nagy@ph1.uni-koeln.de)[1]; Volker Ossenkopf[1]; Floris van der Tak[2,3]; Yunhee Choi[2,3]; Edwin Bergin[4]; Maryvonne Gerin[5]; Christine Joblin[6,7]; Markus Röllig[1]; Robert Simon[1]; and Jürgen Stutzki[1]

[1] I. Physikalisches Institut, Universität zu Köln, Germany
[2] Kapteyn Astronomical Institute, University of Groningen, Netherlands
[3] SRON Netherlands Institute for Space Research, Netherlands
[4] University of Michigan, USA
[5] Observatoire de Paris, École Normale Supérieure, France
[6] Université de Toulouse, France
[7] CNRS, France

Young massive stars have a strong impact on their environment, including feedback due to their Far Ultraviolet (FUV) radiation. The penetration of FUV radiation into the interstellar medium affects the physical and chemical structure of high-mass star forming regions. Photon-Dominated Regions (PDRs) are interfaces between fully ionized and cold molecular material. Spectral line observations at sub-mm and far-infrared wavelengths provide information on the physics and chemistry of PDRs, and therefore help us to understand the impact of young massive stars on their surrounding interstellar medium.

One of the best targets to probe PDR structure and chemistry is the Orion Bar, located at a distance of about 415 pc, with a nearly edge-on geometry. We have carried out an unbiased spectral line survey with Herschel/HIFI in the 480-1250 GHz and 1410-1910 GHz frequency range. We have identified lines from about 30 molecules, including the reactive ions $CH^+$, $SH^+$, $CF^+$, and $OH^+$ (Nagy et al., 2013; Van der Tak and Nagy et al., 2013), the high-J ladder of CO isotopes, and grain chemistry tracers such as $H_2CO$.

We interpret the molecular line emission observed in the HIFI range using detailed non-LTE and PDR models in order to probe the structure and chemistry of the Orion Bar. We present an overview of the HIFI line survey observations and their interpretation using radiative transfer and chemical models.