Questions and Answers

The Formation of Stars and Planetary Systems, 2010, September 6-9, Särö, Sweden

Section & Talk by Karin Öberg

Name/Question Ruud Visser

You mentioned that N_2H^+ is a good tracer of the cold chemistry because CO freezes out below 20 K and can no longer destroy N_2H^+. But doesn't N_2 also freeze out below 20 K? Could this play a role in the lack of correlation you find between N_2H^+ and DCO^+?

Name/Answer

N_2 does indeed freeze out below 20 K, but a few degrees below CO. This should create a narrow band in the disk midplane where N_2H^+ is abundant, since the destroyer of N_2H^+ (CO) is gone, but N_2 is still abundant. Even though this band is narrow in temperature, it should produce a significant N_2H^+ column density because of high densities and shallow ~~dens~~ temperature profiles in disk midplanes. This N_2H^+ band should always be present in disks w/ cod midplanes. In contrast the conditions for cold gas, required for DCO^+, are less well understood and DCO^+ is also more variable across the sample. The lack of DCO^+-N_2H^+ correlation is probably more connected to variations in DCO^+ emission regions than variations in N_2 freeze-out.

Questions and Answers

The Formation of Stars and Planetary Systems, 2010, September 6-9, Särö, Sweden

Section & Talk by K. Öberg

Name/Question A. CARMONA

Previous studies have been performed to study chemistry in disks. How the results of your survey, compare with previous observations.

Name/Answer

Where the same sources have been observed previously, the results are consistent. This especially concerns single-dish observations of DM Tau, LkCa 15 and MWC 480. Previous 3-4 object surveys also contained hints of the trends seen in DISCS; eg. Dutrey et al. 2007 detected N_2H^+ 1-0 emission toward DM Tau and LkCa 15, but not MWC 480, consistent w/ our observations of cold chemistry tracers only toward low-luminosity objects. Concerning molecular emission regions Qi et al. 2008 found that the cold gas-chemistry tracer DCO^+ does not extend to the outer edge of the TW Hya disk, consistent with our preliminary IM Lup results.

Questions and Answers

The Formation of Stars and Planetary Systems, 2010, September 6-9, Särö, Sweden

Section & Talk by ..... K. Öberg .....

Name/Question ..... O. Panić .....

Do you expect that disc physical properties, such as flaring and settling degrees, have an important role for the chemistry that you observe? Or is the spread in stellar luminosity in your sample so great that one can expect that the chemistry would reflect the stellar luminosity?
This is interesting since Herschel probes the outer disc geometry, by filling the missing FIR SED fluxes for these sources.

Name/Answer .....

For the disk heating affecting the cold chemistry, the stellar luminosity seems to be the dominating variable in the survey. There is however no correlation between stellar luminosity and the radiation chemistry tracers CN and HCN. For these and other species, disk structure (flaring and settling) as well as dust growth may be important for the chemical evolution. Conceptually this can be understood from the fact that disk structure determines how much radiation is intercepted as well as how high-energy radiation (UV, X-ray) penetrates down toward the disk midplane.