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ALMA observations of Titan : Vertical and spatial distribution of nitriles

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Abstract

We report submm observations of Titan performed with the ALMA interferometer centered at the rotational frequencies of HCN(4-3) and HNC(4-3), i.e. 354 and 362 GHz. These measurements yielded disk-resolved emission spectra of Titan with an angular resolution of ~0.47''. Titan's angular surface diameter was 0.77''.
Data were acquired in summer 2012 near the greatest eastern and western elongations of Titan at a spectral resolution of 122 kHz ($\lambda/d\,\lambda = 310^6$).

We have obtained maps of several nitriles present in Titan' stratosphere: HCN, HC_3N, CH_3CN, HNC, C_2H_5CN and other weak lines (isotopes, vibrationnally excited lines).

We will present radiative transfer analysis of the spectra acquired. With the combination of all these detected rotational lines, we will constrain the atmospheric temperature, the spatial and vertical distribution of these species, as well as isotopic ratios.

Moreover, Doppler lineshift measurements will enable us to constrain the zonal wind flow in the upper atmosphere.

1. Figures

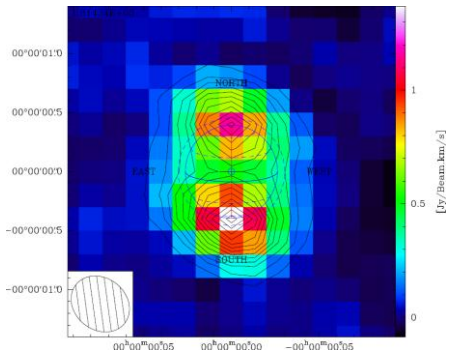

Figure 1: HC_3N map of Titan performed with ALMA. The blue circle corresponds to the surface radius. The beam size in shown in the lower left corner.

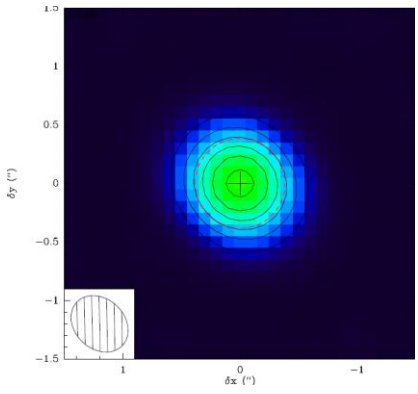

Figure 2: Continuum map of Titan at 356 GHz.

Acknowledgements

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