

## Effect of GCR on the atmospheric chemistry process of Titan: a new constraint by the determination of $^{14}\text{N}/^{15}\text{N}$ in $\text{CH}_3\text{CN}$ with ALMA

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By analyzing archival data obtained by the Atacama Large Millimeter/submillimeter Array (ALMA), we have successfully detected rotational transitions of  $\text{CH}_3\text{C}^{15}\text{N}$  ( $J = 19\text{--}18$ ) at the 338 GHz band in Titan's atmospheric spectra.

Using the radiative transfer analysis, comparing those observations with the simultaneously observed  $\text{CH}_3\text{CN}$  ( $J = 19\text{--}18$ ) lines at the 349 GHz band, which probe from 160 to  $\sim 400$  km altitude, we then derived  $^{14}\text{N}/^{15}\text{N}$  in  $\text{CH}_3\text{CN}$  as 125 (+145/-44). The best-fit value suggests that  $^{14}\text{N}/^{15}\text{N}$  for  $\text{CH}_3\text{CN}$  is higher than values that have been previously observed and theoretically predicted for HCN and  $\text{HC}_3\text{N}$ .

This may be explained by the different  $\text{N}_2$  dissociation sources according to the altitudes, as suggested by a recent photochemical model.

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