



CO and D/H: Evolution and Origin of Titan's Atmosphere

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Observations of the C-18O(3-2) and ¹³CO(3-2) rotational transitions were obtained 9 Nov 2007 using the Submillimeter Array (SMA). In addition, the first detection of the C-18O(6-5) rotational transition, at 658.553 GHz, was made using SMA data from 14 Dec 2005. Preliminary measurements of the isotopic ratios ¹²C/¹³C and ¹⁶O/¹⁸O will be presented. In addition, the Cassini mission provides updated D/H ratios in CH₄ and C₂H₂. Incorporating laboratory measured rate coefficients in isotope-variant chemical reactions (both two-body and photolytic reactions) into a photochemical model, the profiles of C-16O, C-18O, CH₄, CH₃D, C₂H₂, C₂HD, C₂H₆, C₂H₅D, and other C₂ hydrocarbons are obtained. Implications of the model results to the evolution and origin of Titan's atmosphere are discussed.