**The Chemistry of Oxidized Carbon in Comet C/2002 T7 (LINEAR) revealed through Infrared Spectroscopy**

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**Introduction:** Cometary nuclei are the most primitive remnants of the early Solar System. Their physical and chemical attributes allow a glimpse into the conditions in which icy bodies formed. Parent volatiles in comets are now routinely studied, and a significant diversity in composition among the comets sampled to date has been demonstrated. This forms the foundation of an emerging cometary taxonomy based on chemical composition. [1] [2]

**Observations and Results:** In spring 2004, we observed comet C/2002 T7 (LINEAR) using the facility echelle spectrometer (CSHELL) at the NASA Infrared Telescope Facility on Mauna Kea, Hawaii. CSHELL offers seeing-limited spatial resolution and sufficiently high spectral resolving power (R ~ 2.5 x $10^4$) to permit line-by-line intensities to be measured along its 30 arcsecond slit. Emission lines from multiple molecular species were targeted in the 3 to 5 μm wavelength region. Our observations revealed an extremely rich chemistry in C/2002 T7. [3]

Here we present rotational temperatures, production rates, and mixing ratios for CO, $H_2O$, $H_2CO$ and $CH_3OH$ spanning UT May 3-9 2004 ($R_h$ = 0.66 – 0.71 AU ) and UT May 30 - June 2 2004 ($R_h$ ~ 1.0 AU). Comparisons in chemical abundance with heliocentric distance will be discussed as a test for possible compositional heterogeneity within the nucleus of C/2002 T7.

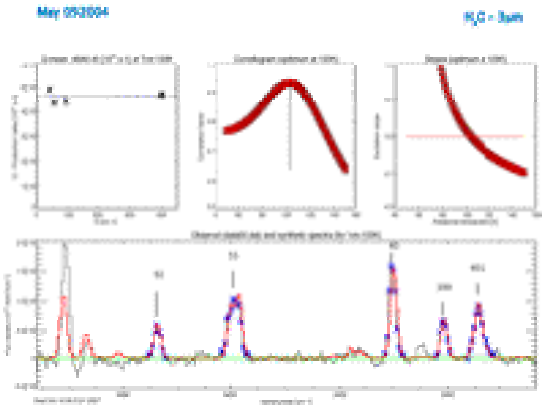

Figure 1: The observed spectra and the related rotational temperature analysis for 3 micron water detected in C/2002 T7 LINEAR on May 9, 2004.

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**References:** [1] Mumma, M. J., et al. 2003. *Advances in Space Research* **31**, 2563-2575 [2] DiSanti, M. A., M. J. Mumma, et al. 2003. *J Geophysical Research* **108**, 15(1-19). [3] DiSanti, M. A., Bonev, B.P., et al. 2006. *ApJ* **650**, 470-483