Astrochemistry: Recent Successes and Current Challenges
Poster Book IAU Symposium No. 231, 2005
A. J. Markwick-Kemper, ed.

DOI: 00.0000/X000000000000000X

The Spitzer/XMM-Newton Surveys of Taurus: IRS Spectroscopy Combined with IRAC/MIPS Photometry and X-Ray Data

Marc Audard[1], Manuel Güdel[2], Deborah Padgett[3], Sebastian Wolf[4], Kevin Briggs[2], Sergio Fajardo-Acosta[3], Adrian Glauser[2], Patrick Morris[3], Luisa Rebull[3], Stephen Skinner[5], and Karl Stapelfeldt[6]

[1]Columbia Astrophysics Laboratory, Columbia University, Mail Code 5247, 550 West 120th Street, New York, NY 10027, USA, email: audard@astro.columbia.edu

[2]Paul Scherrer Institut, 5232 Villigen PSI, Switzerland, email: guedel, briggs@astro.phys.ethz.ch, adrian.glauser@psi.ch

[3]Spitzer Science Center, Mail Code 220-6, 1200 E. California Blvd., Pasadena, CA 91125, USA, email: dlp,fajardo,pmorris,rebull@ipac.caltech.edu

[4]Max-Planck-Institut für Astronomie, Königstuhl 17, 69117 Heidelberg, Germany, email: swolf@mpia.de

[5]Center for Astrophysics and Space Astronomy, University of Colorado, Boulder, CO 80309-0389, USA, email: skinners@casa.colorado.edu

[6]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109, USA email: krs@exoplanet.jpl.nasa.gov

Abstract. The *Spitzer* archive contains an IRS database of about 100 Taurus Molecular Cloud (TMC) objects observed as part of the *Spitzer IRS_disks* GTO program. Such data show lines and bands of various molecules such as CO, PAHs, silicates, etc that allow us to probe the chemical composition of the circumstellar material. We have undertaken an analysis of the TMC IRS spectra in combination with IRAC and MIPS photometry obtained in early 2005 as part of a survey which has mapped the entire TMC (29 square degrees) in all IRAC (3.6, 4.5, 5.8, and 8 μm) and MIPS (24, 70, and 160 μm) photometric bands. This survey will obtain a census of the infrared emission of young stars and disks to below the deuterium burning limit. The IRS spectra are combined with IRAC and MIPS photometry to model the circumstellar gas and dust material. In addition, we include information based on the parallel *XMM-Newton* survey of the richer part (5 square degrees) of the TMC in the X-ray regime ($0.1-10$ keV). The deep sensitivity limit ($L_{\rm X} \sim 5 \times 10^{27}$ erg s^{-1} for low $N_{\rm H}$) easily gives us access to the detection of young brown dwarfs and deeply embedded protostars. The inclusion of the X-ray data will help us to understand the impact X-rays on i) the chemistry of accretion disks and circumstellar envelopes, and ii) on the ionization and heating of the disk. We present here an overview of the *Spitzer* and *XMM-Newton* surveys and preliminary results on the IRS spectroscopy of TMC young stars.

Keywords. accretion disks, astrochemistry, infrared: stars, stars: formation, X-rays: stars