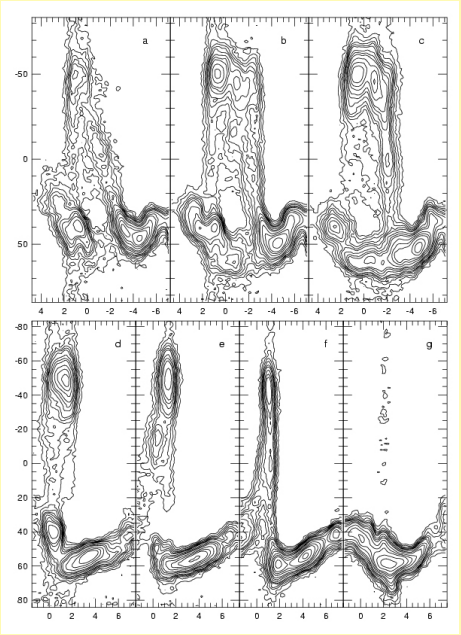

Position-velocity diagrams of [S IV] (10.5 μm) emission from W51 IRS 2. The horizontal axes are labeled in arcseconds. The vertical axes are labeled in km/s (LSR). The emission near +60 km/s is from the ionized surface of the W51 molecular cloud. The negative velocity emission is from a massive molecular jet which is photoionized when it emerges from the molecular cloud into an OB star cluster. (Lacy et al. 2007, ApJ Letters)

TEXES Team

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Additional details about TEXES can be found at
http://www.gemini.edu/sciops/instruments/texes/

AURA NSF

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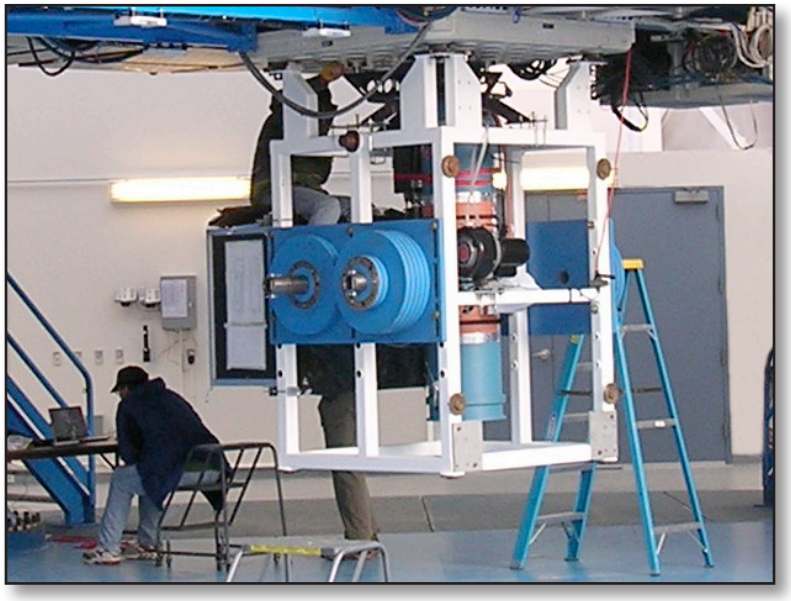
TEXES

High Resolution Mid-IR Spectrograph



TEXES mounted on the up-looking port of Gemini North

Offered at ***Gemini North***

NOAO University of Texas

TEXES

TEXES, the Texas Echelon Cross Echelle Spectrograph, is a visitor instrument on Gemini North. The instrument is available to all members of the Gemini community, but one or more members of the TEXES team must be a co-I on all proposals. The TEXES team member will carry out the observations, reduce the data, and collaborate on publications. A description of the instrument and its use is found in the paper by Lacy, et al. (2002, PASP, 114, 153).

TEXES Capabilities

Resolution:
R~100000 ($\lambda/\Delta\lambda$ with $\Delta\lambda$ = 3 pixels) at λ < 10 microns

Fixed wavenumber resolution = 0.01 cm^{-1} at λ > 10 microns

Wavelength Coverage: 0.5 or 1.5% (1500 or 4500 km s^{-1})

Overall Range:
5-20 microns & 22-25 microns (5.5-8 microns & 14-16.9 microns blocked by the atmosphere)

Cross Dispersed:
The main grating has an order separation of 0.662 cm^{-1} (0.0066 microns at 10 microns).

Two cross-disperser gratings:
31 line mm^{-1} echelle: 0.5% spectral coverage (i.e., 0.05 microns at 10 microns, or a velocity range of ±750 km/s), slit length ~ 4 arc-seconds at 10 microns

75 line mm^{-1} first-order grating: 1.5% spectral coverage
at 10 microns, slit length ~ 1.7 arc-seconds at 10 microns

Slit width: Usually set to diffraction limit of $2\lambda/D$ (~ 0.5 arc-seconds at 10 microns)

Sky cancellation: Nods or step mapping, not chop

Detector:
Raytheon 256 × 256 pixel Si:As array
QE ~ 30%
well depth ~ 100000 electrons
read noise ~ 30 electrons background noise limited

Telluric standards: Required, time must be included in time request (for TEXES, telluric standards are not included in Gemini overhead). Asteroids frequently best targets.

Preliminary sensitivity estimates:
Table gives sensitivity estimates in terms of point source brightness for which S/N = 5 would result from 1 hour of clock time, in each spectral resolution element. The sensitivity is similar to Michelle in echelle mode, but with 3 times higher spectral resolution and larger wavelength coverage, but a shorter slit.
See Web pages for details.

Wavelength	Point Source magnitude	Point Source Flux (Jy)	Surface Brightness (1.e-07 W/m^2/ster)	Unresolved line flux (1.e-18 W/m^2)
5.0	7.8	0.12	1.3	0.8
8.0	6.2	0.2	1.5	0.8
9.0	5.1	0.43	2.6	1.5
10.0	4.8	0.48	2.6	1.5
11.0	4.8	0.26	1.0	0.8
12.0	4.9	0.28	1.0	0.9
13.0	4.7	0.31	1.0	1.0
17.0	3.4	0.57	1.0	1.7

The above estimates assume nodding along the slit. Off-slit nods required by extended objects or when observing with the 75 line/mm cross-disperser decrease efficiency by a factor of 2 (and hence sensitivities by 1.4).

Sensitivities assume < 3% atmospheric emissivity or 10% total emissivity including instrument and telescope. At 17-24 micron 20% total background emissivity. To determine the sensitivity at a specific wavelength, it is necessary to determine the atmospheric emissivity and multiply by $(1+atmo_{emiss}/.1)^{0.5}/(.93-atmo_{emiss})$ at 5-13 micron, or $(1+atmo_{emiss}/.2)^{0.5}/(.93-atmo_{emiss})$ at 17-24 micron. Grating blaze can degrade sensitivity by an additional factor of 1.4.

Line sensitivities assume the line is narrow compared to the spectral resolution. For broader lines, the sensitivity numbers must be multiplied by the square root of the number of resolution elements over which the line is spread.