EXES: The Echelon-Cross-Echelle Spectrograph for SOFIA

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What is EXES?
• First generation spectrograph for SOFIA
• Operates between 4.5 and 28.3 μm
• Three spectral modes and a camera mode for slit positioning
  - high (R~100,000)
  - medium (R~15000)
  - low (R~3000)
• Uses a 1024x1024 Si:As detector optimized for low background
• Features an echelon, a coarsely-ruled, steeply-blazed Al reflection grating for high resolution

The Advantage of SOFIA
A comparison of atmospheric transmission at Mauna Kea (blue) and from SOFIA (red) for selected molecular species.

Science Goals
- Chemistry and dynamics of molecules (H₂O, CH₄, and others) around HII regions, YSOs, disks.
- Atmospheres of mass-losing AGB stars
- Abundances in comets, solar system planets and moons’ atmospheres

Sensitivity
We plot the estimated Noise Equivalent Flux Density (NEFD) for S/N = 10 in 900s of integration on a point source. For comparison, Vega is included on all three plots. SOFIA is able to observe single targets for up to ~4hrs continuously.

Status of EXES
EXES is currently at DAOF completing final tests before beginning its first commissioning flights on SOFIA on April 7th and 9th. Exes will have its second round of commissioning flights later this year. In addition, EXES will be part of the Cycle 2 science flights during the latter part of 2014. All of EXES’s modes will be available during the SOFIA Cycle 3 call for proposals for the general community.

EXES Lab Tests
EXES has tested as much as possible in the lab to alleviate need for time on the plane
- Sensitivity testing at all wavelengths using the room or temperature controlled blackbody
  - High-resolution mode, C₂H₂ gas cell spectrum
  - 726.2-731.9 cm⁻¹
  - R=100500 with 1.5” slit
- Use of Ames TAAS (SOFIA telescope simulator) to determine:
  • Platescale
  • Boresight
  • Focus
  • pupil size
  • pupil alignment
  • test observations

References