Precision Multi-Object Radial Velocity Surveys with a Dispersed Fixed Delay Interferometer

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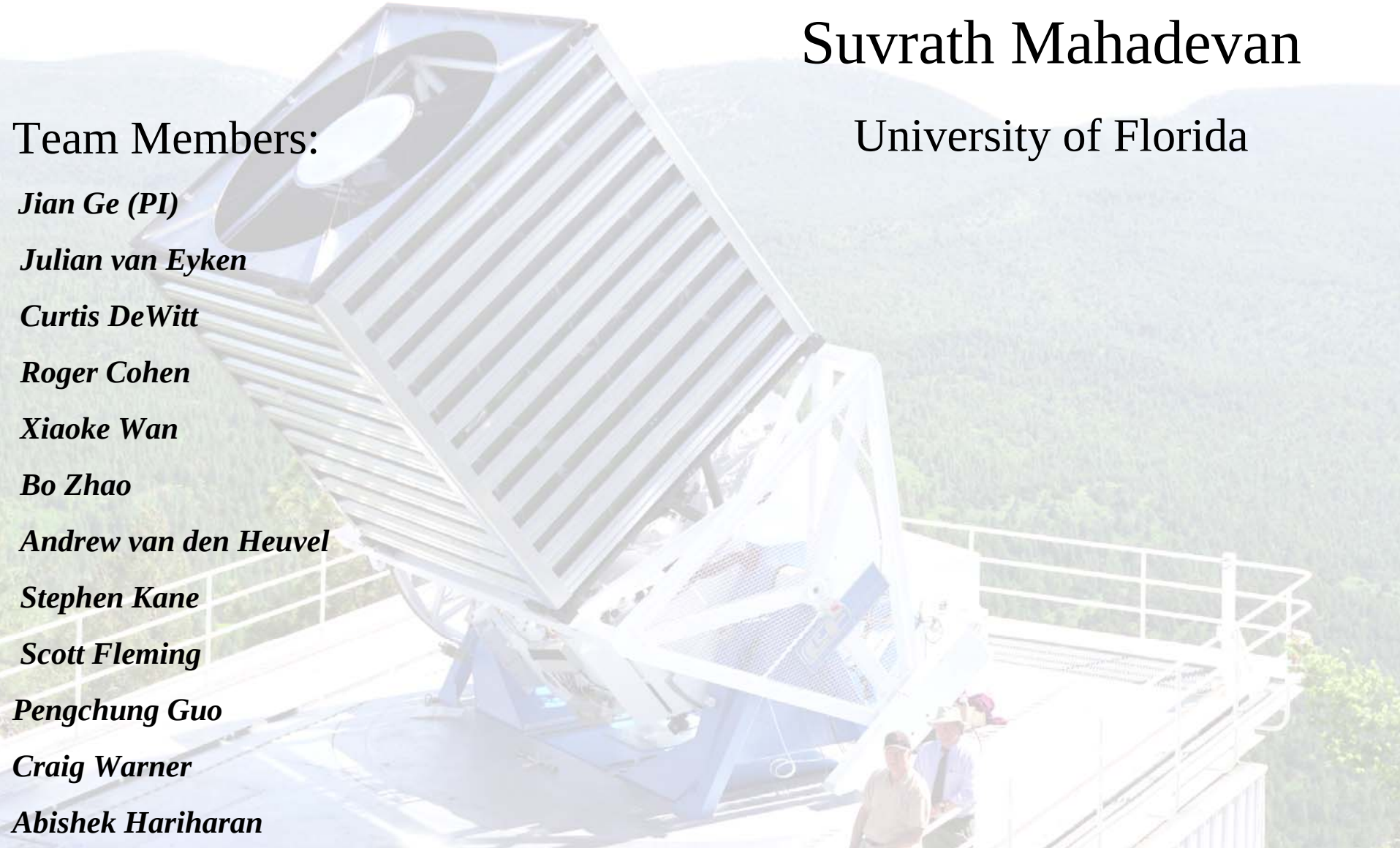
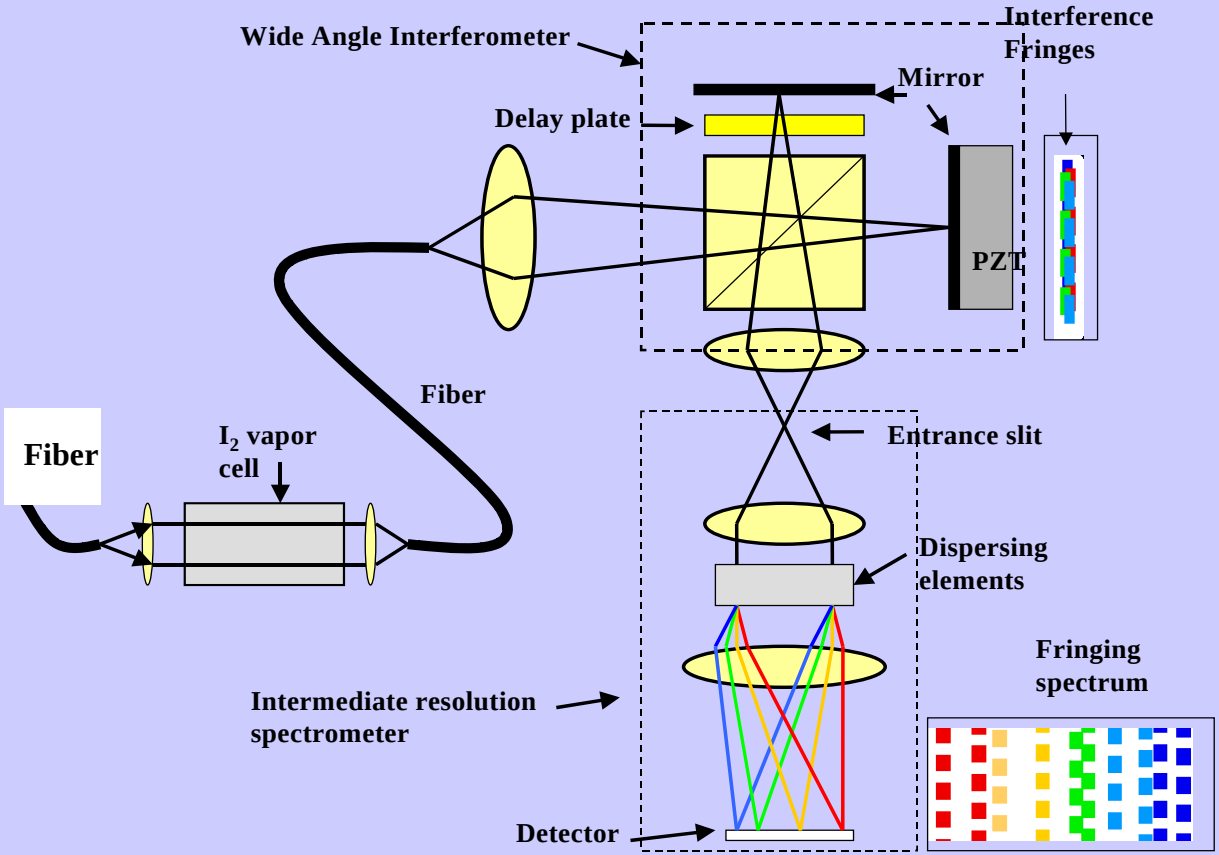


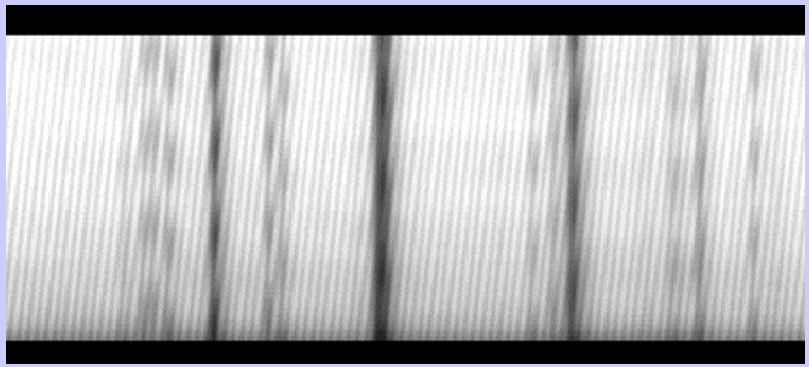
ET: The Exoplanet Tracker



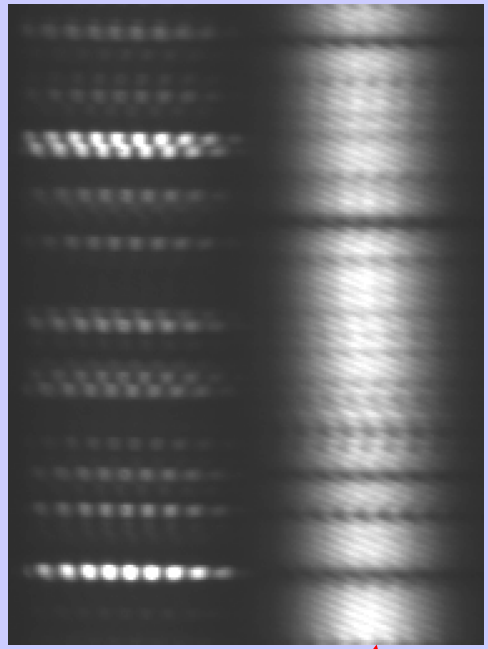
Erskine & Ge 2000; Ge, Erskine, Rushford 2002

ET: The Exoplanet Tracker

Slit Direction



Dispersion Direction

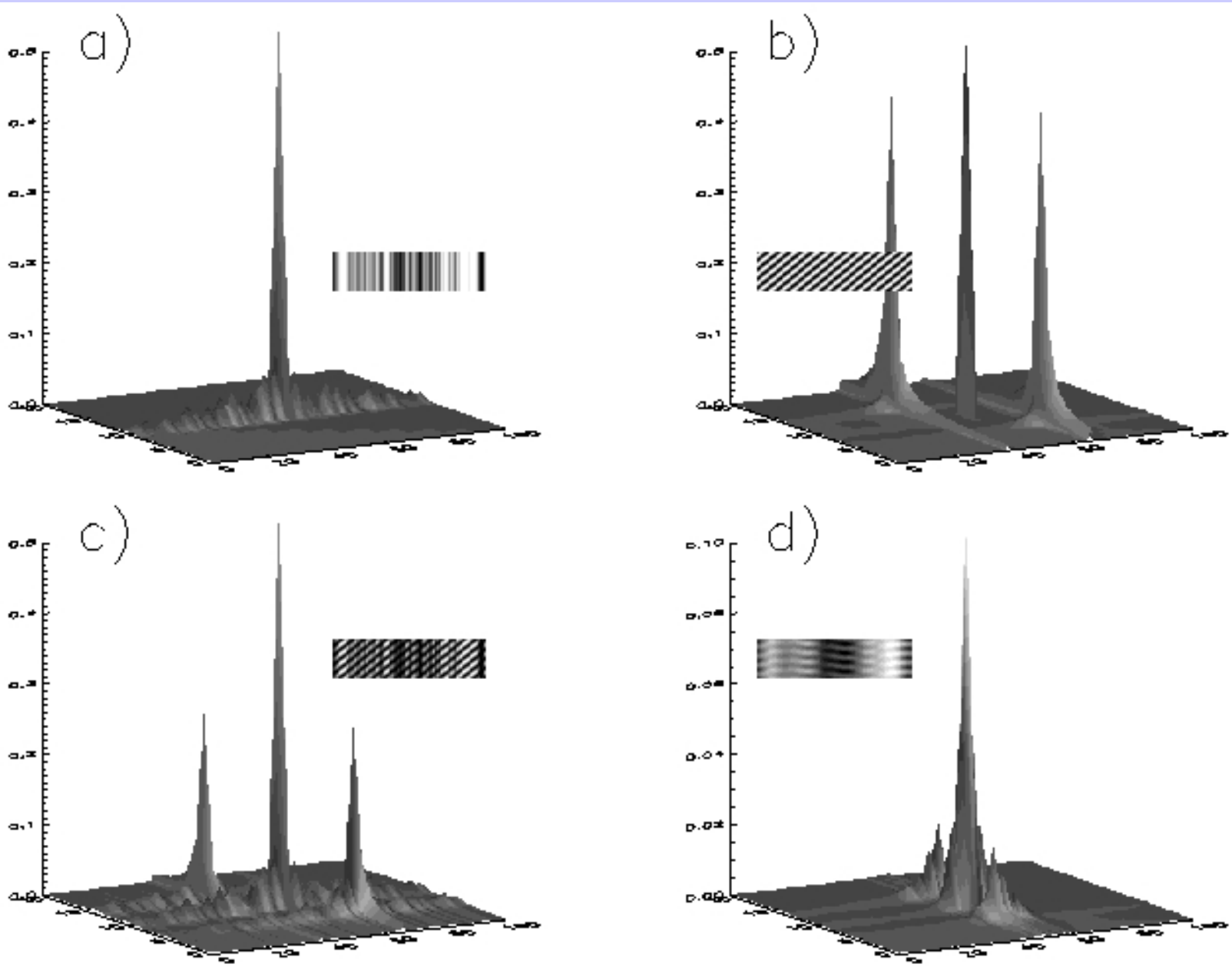


Thorium-Argon Reference

Aldebaran

Instead of looking at line shifts like a conventional spectrograph, ET will look at the drifts in the interference fringes and convert this drift to velocity

The Basic Principle: Information Heterodyned



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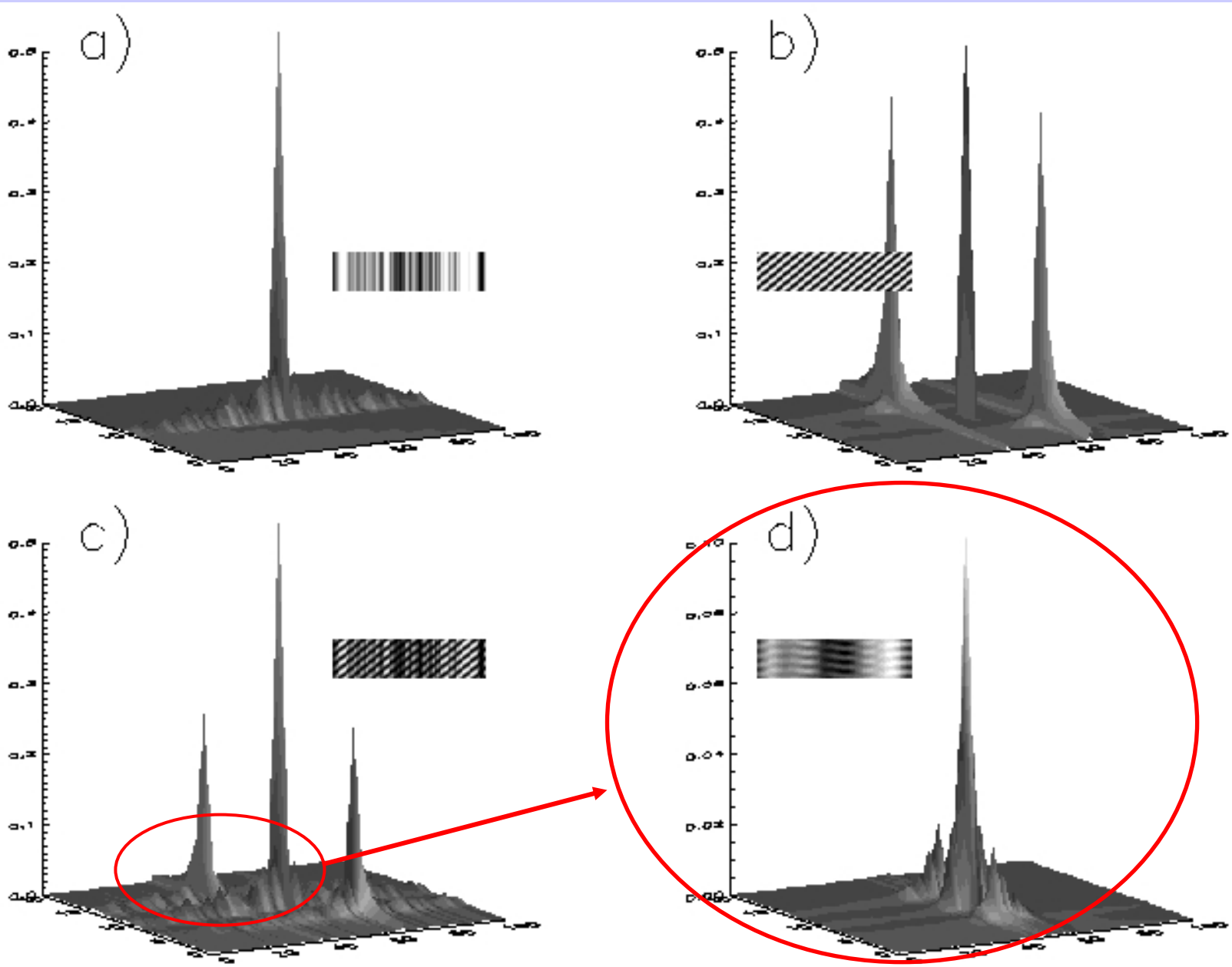
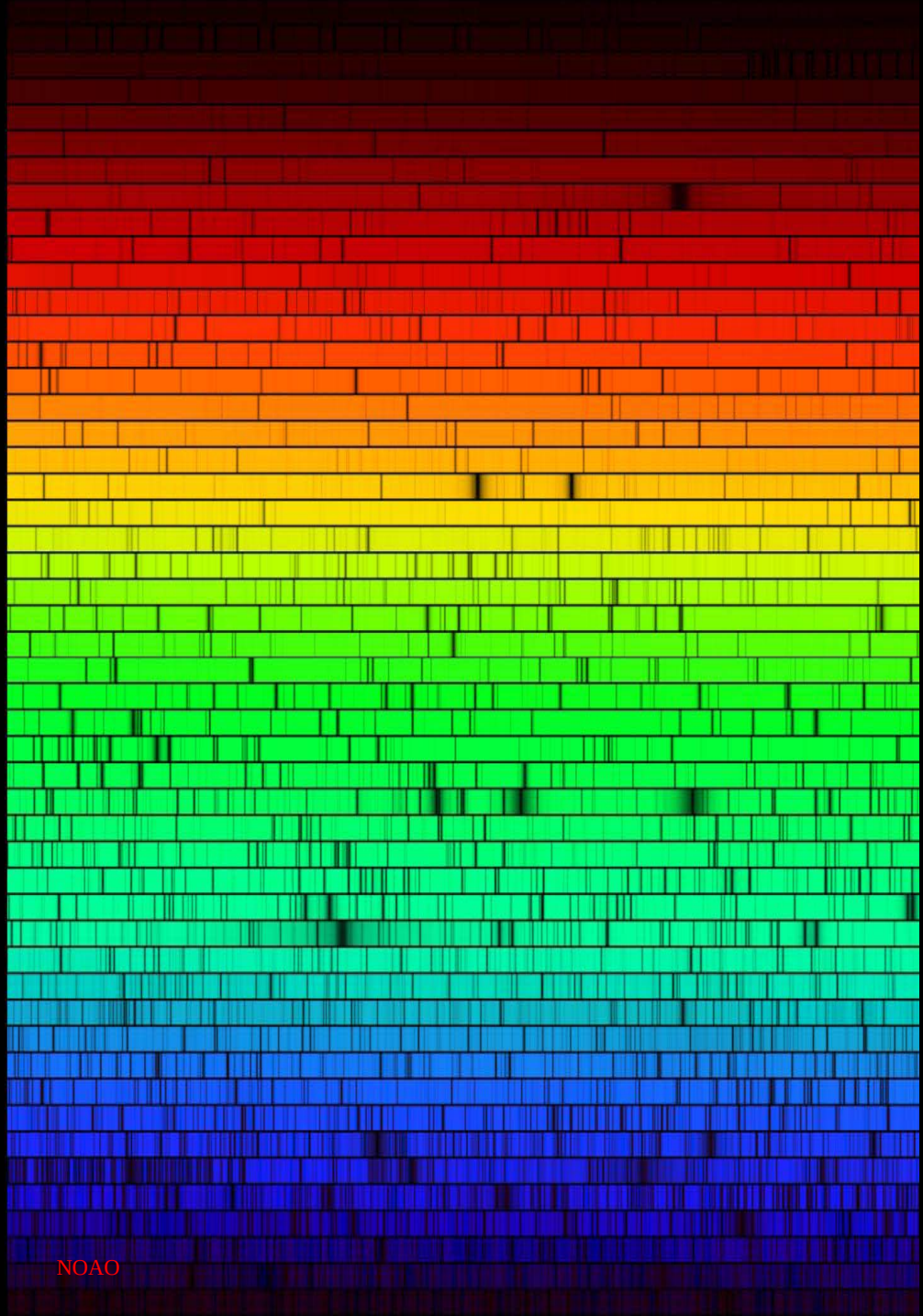
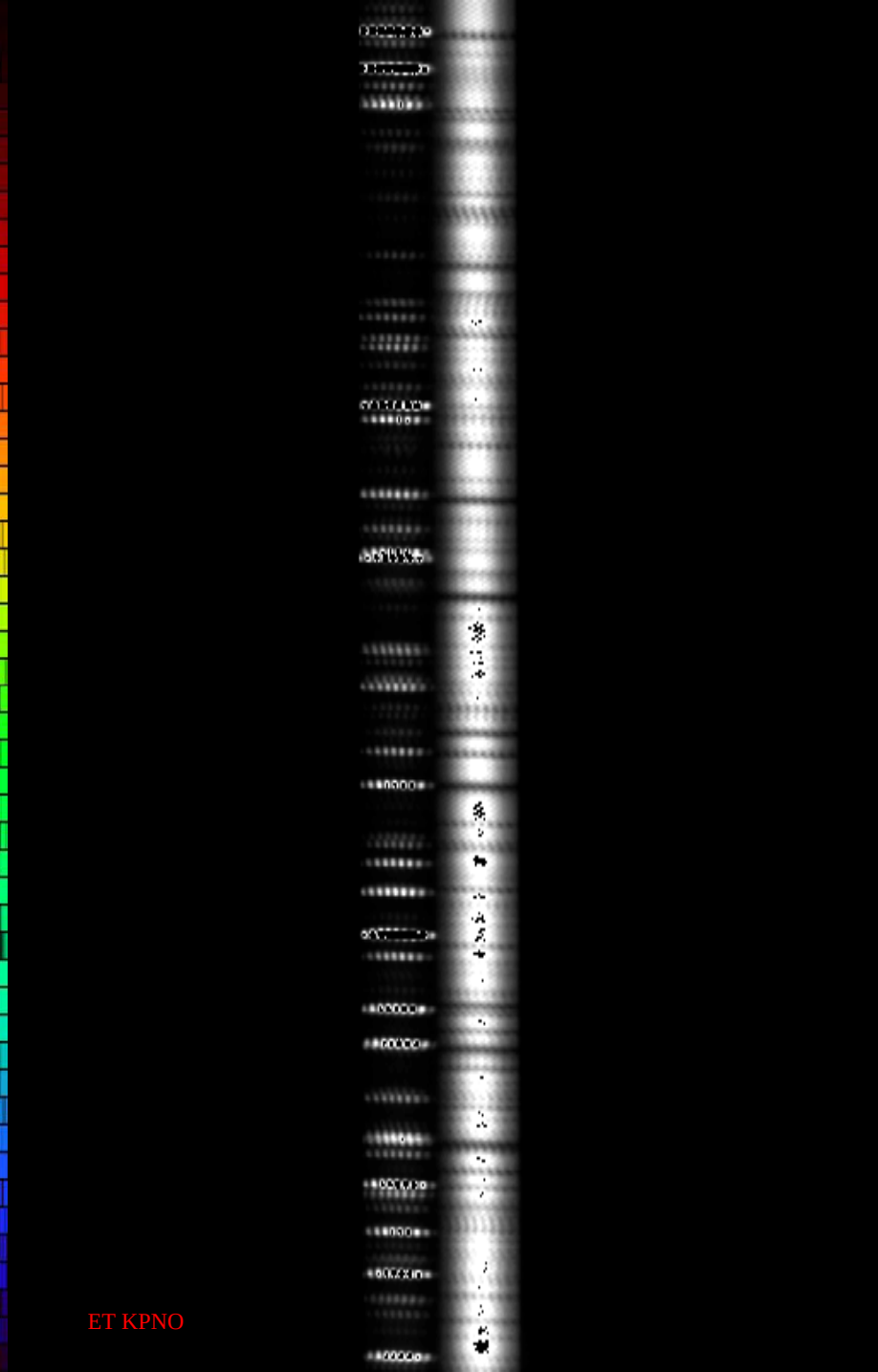
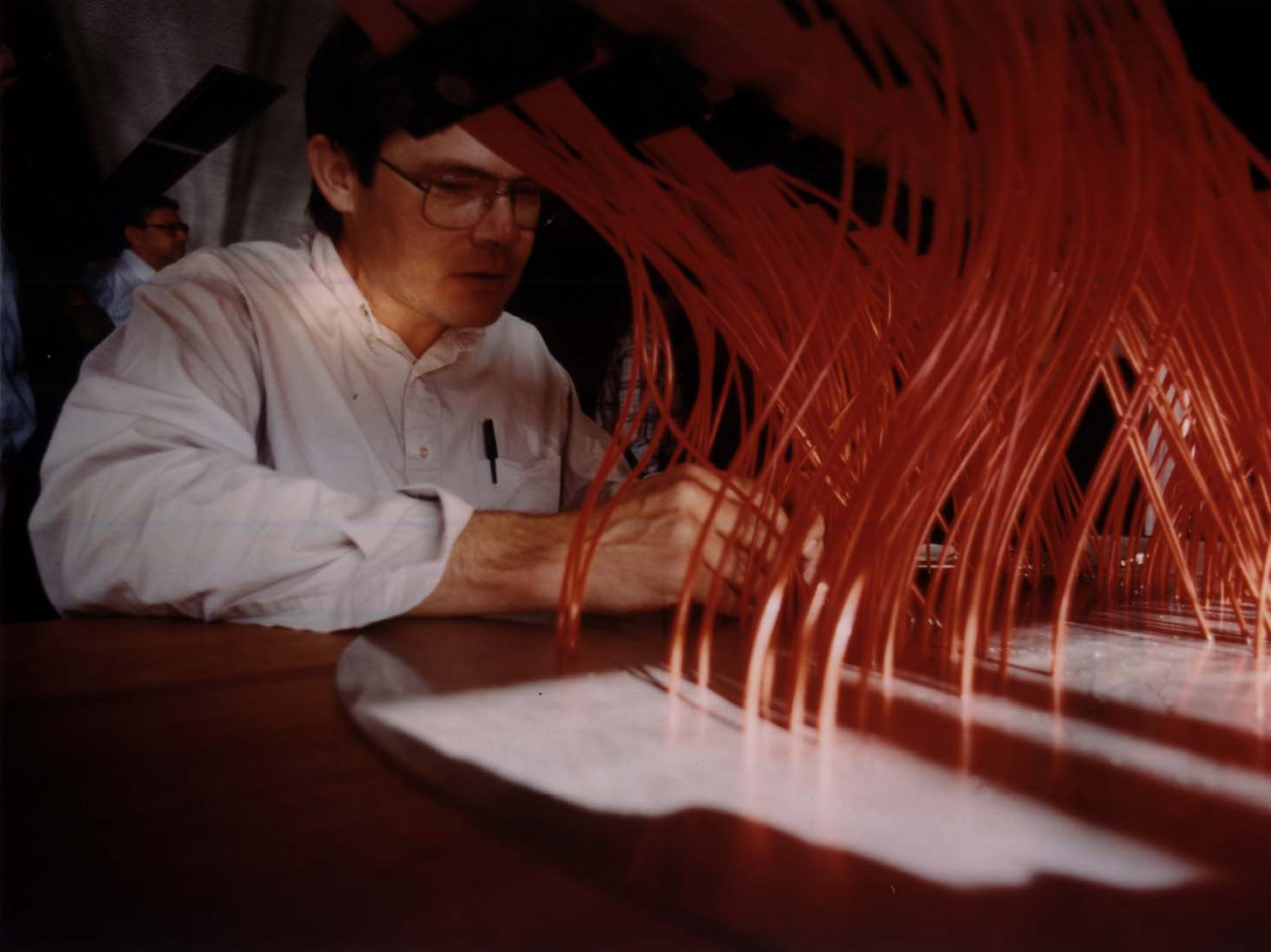


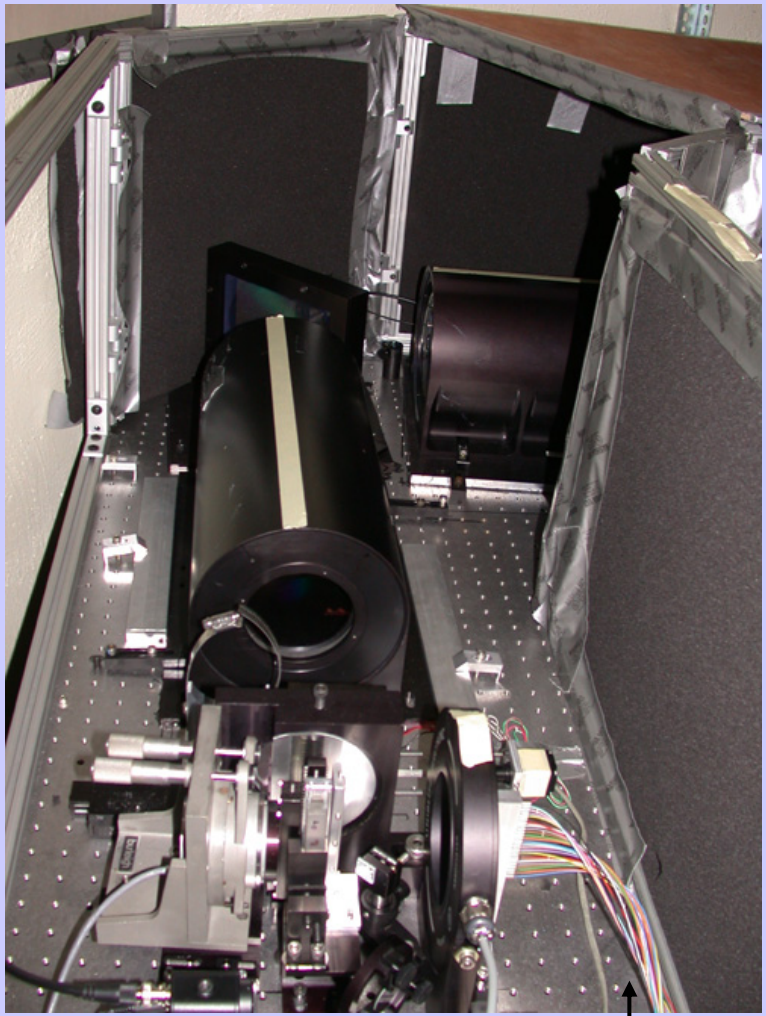

NOAO


ET KPNO

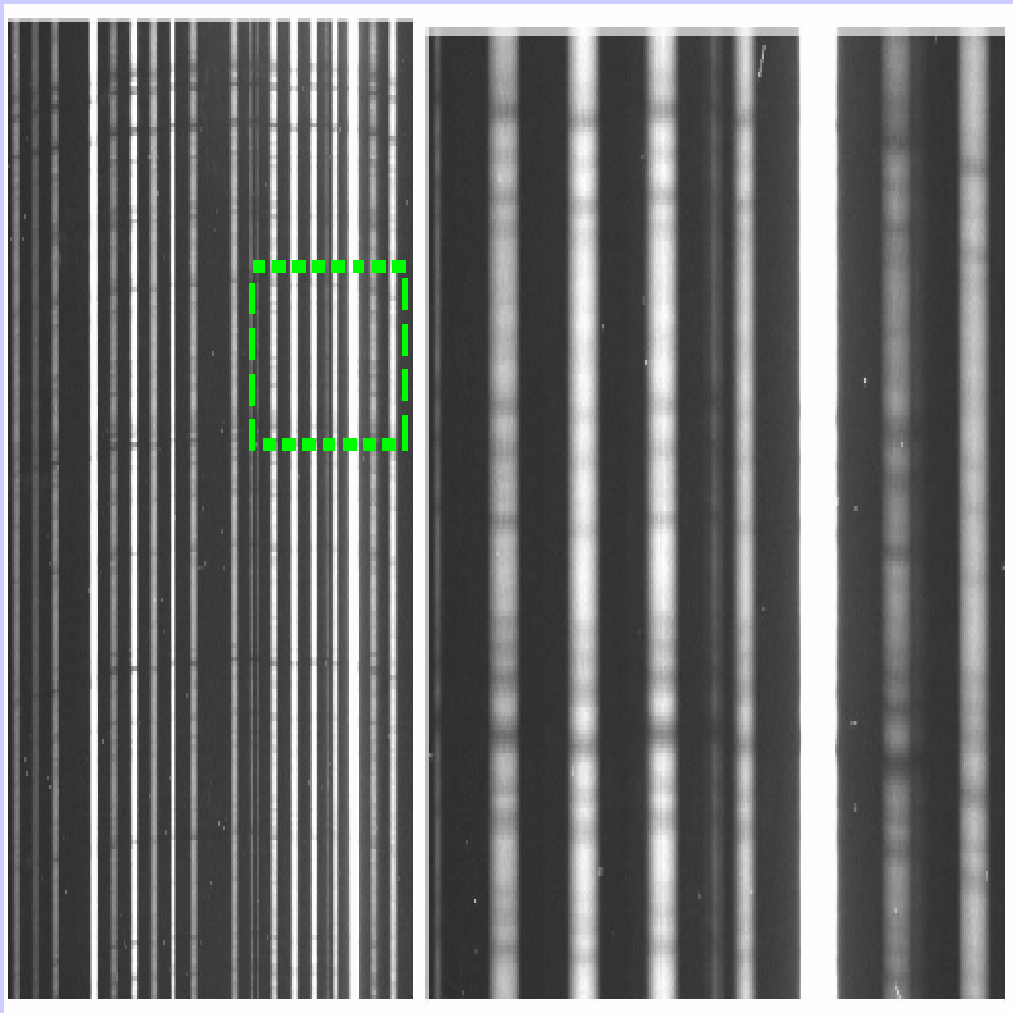


Prototype Multi-Object RV instrument on Sloan 2.5m

March, April 2005



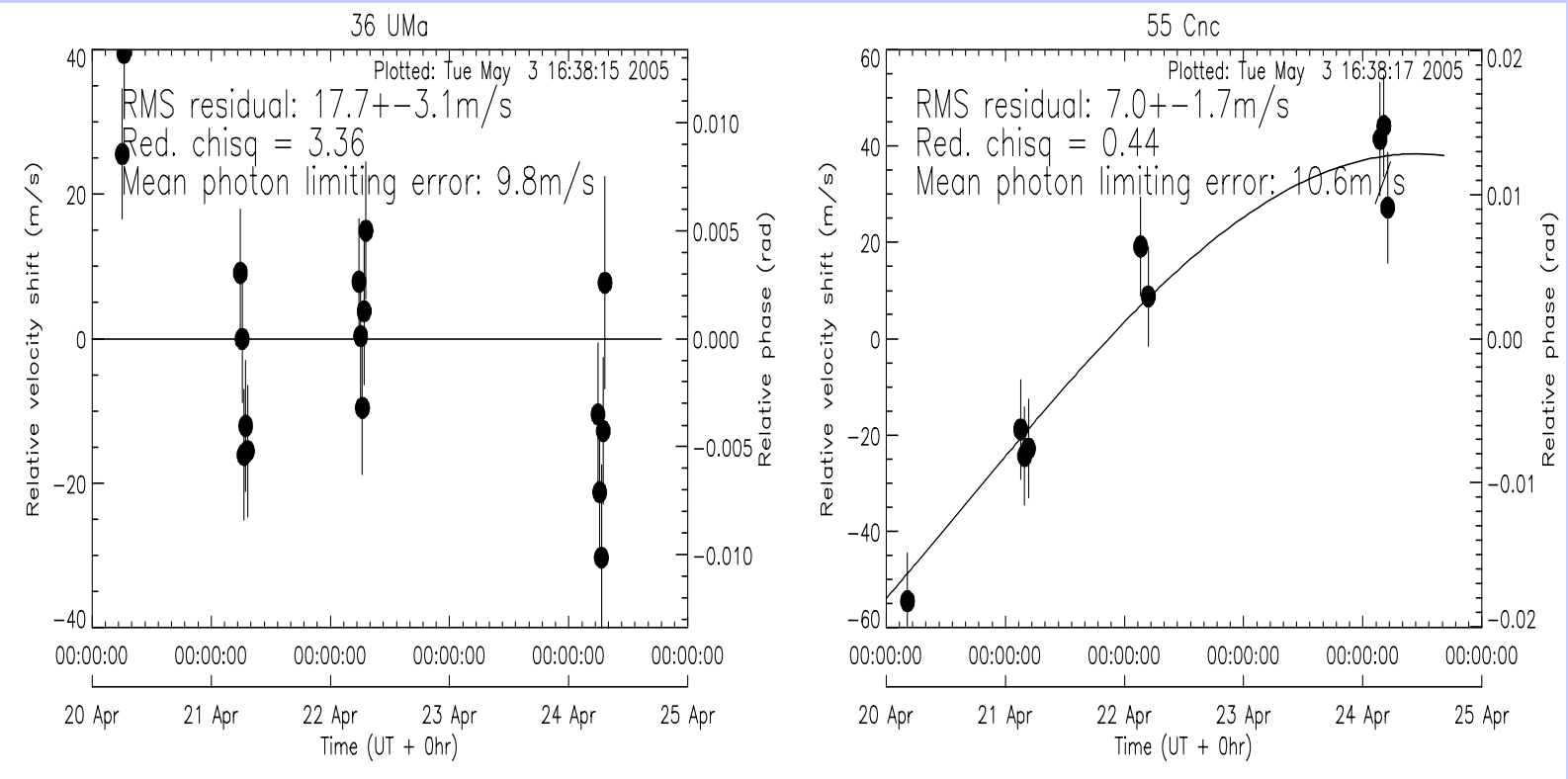
25 Fibers



20 Spectra, **V=8-11** in **30** min. exposure

Prototype Multi-Object RV instrument on Sloan 2.5m

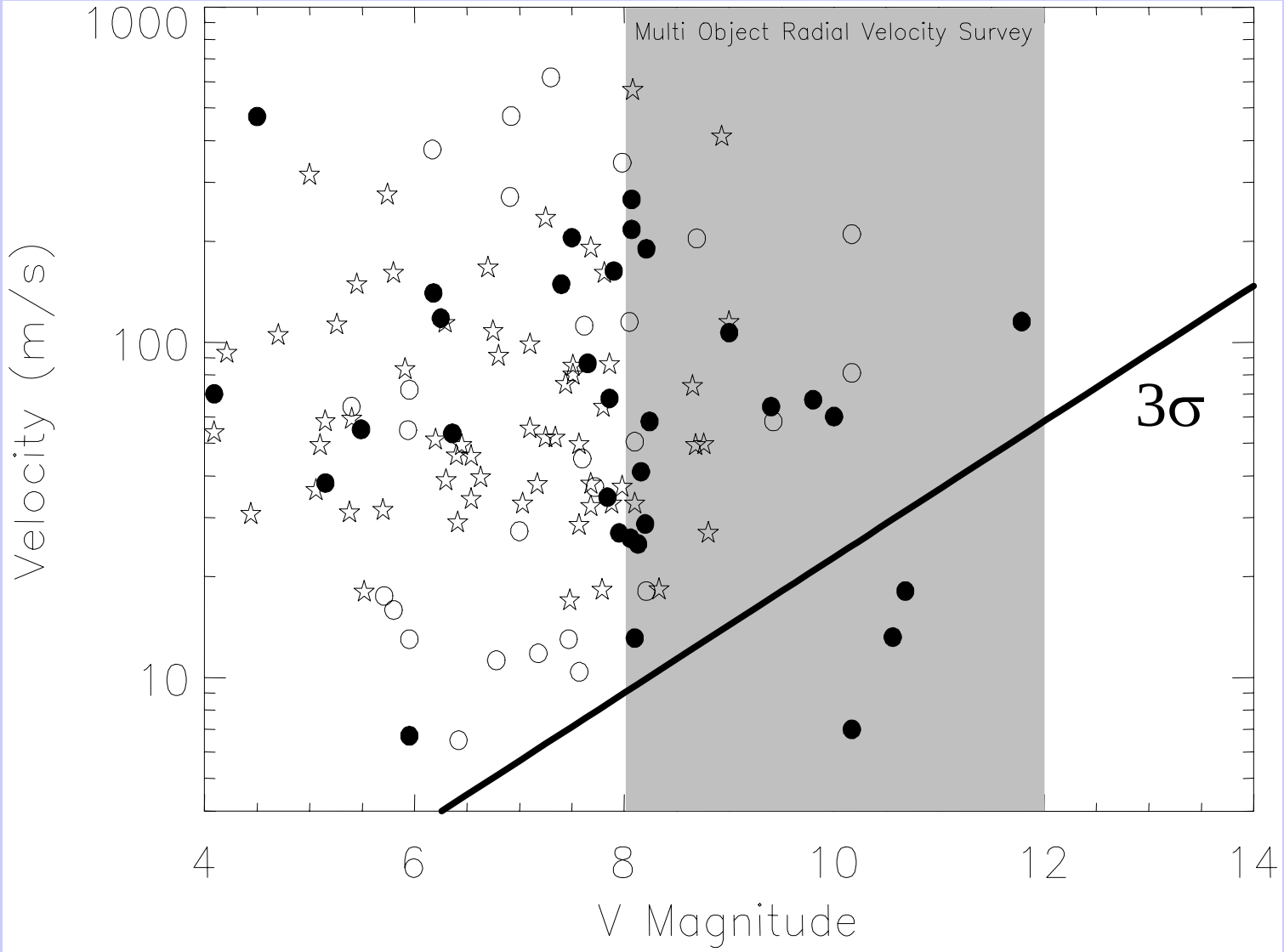
March, April 2005



Prototype low efficiency (1-3%) compared to KPNO ET.

Worse stability. Yet, σ = 10-20m/s! **Proof of Concept!**

Multi-Object Radial Velocity Instrument



No of Objects

50

Exposure Time

60 min.

First Light

MARCH 06

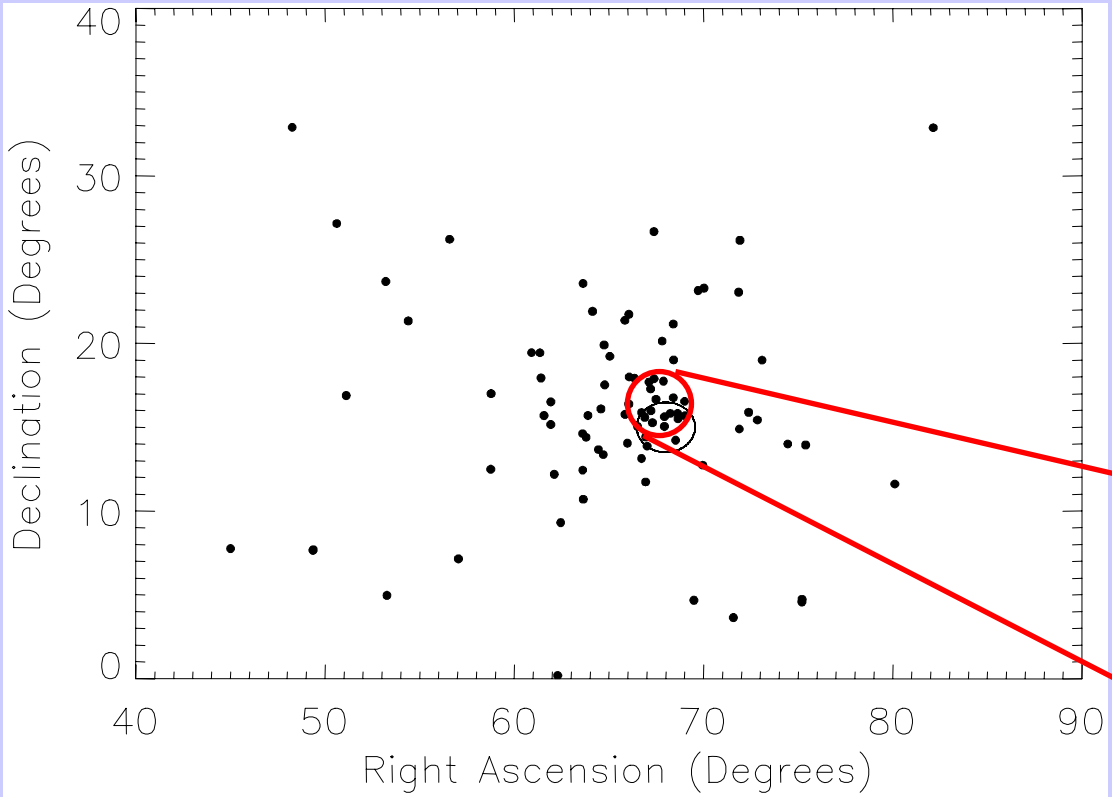
Wavelength Coverage =1000 Angstroms. σ = 3m/s for V=8, σ = 20m/s for V=12

Surveying Open Clusters with the Multi-object Instrument

Keck Hyades Cluster Survey –*Cochran et al. 2002*

~100 F, G, K, M stars surveyed using many nights of Keck time

~ 15 minute per star, σ = 3-6 m/s



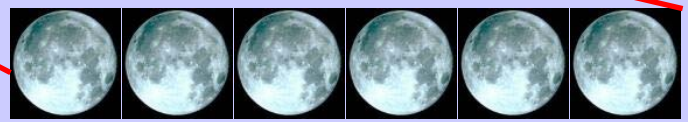
For 15 stars

Keck – 3.75 hours, σ = 3-6 m/s

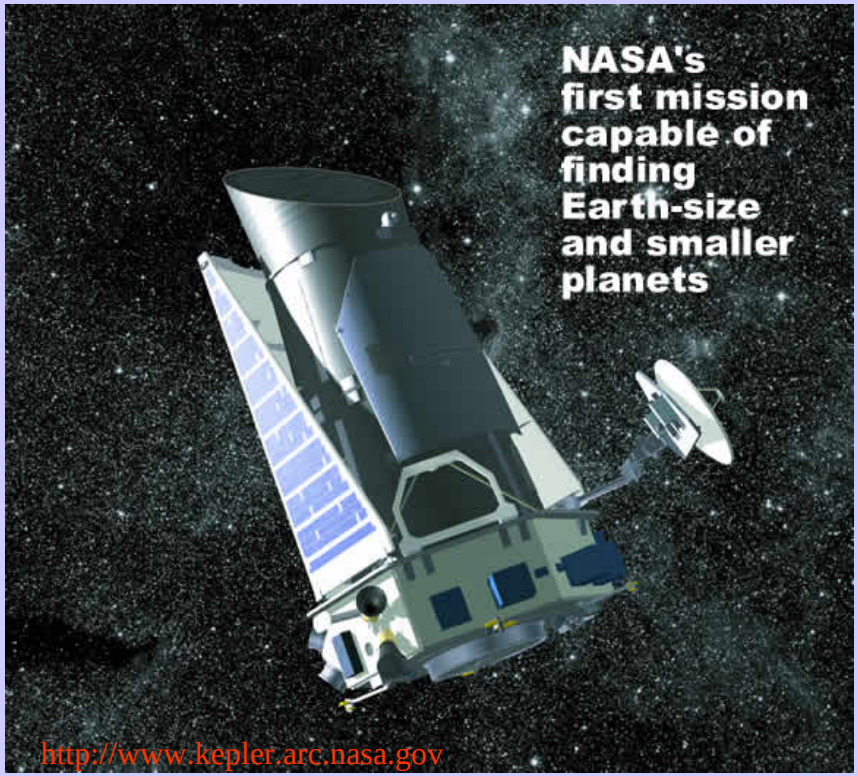
Sloan 2.5m – 1 hour, σ = 3-20 m/s

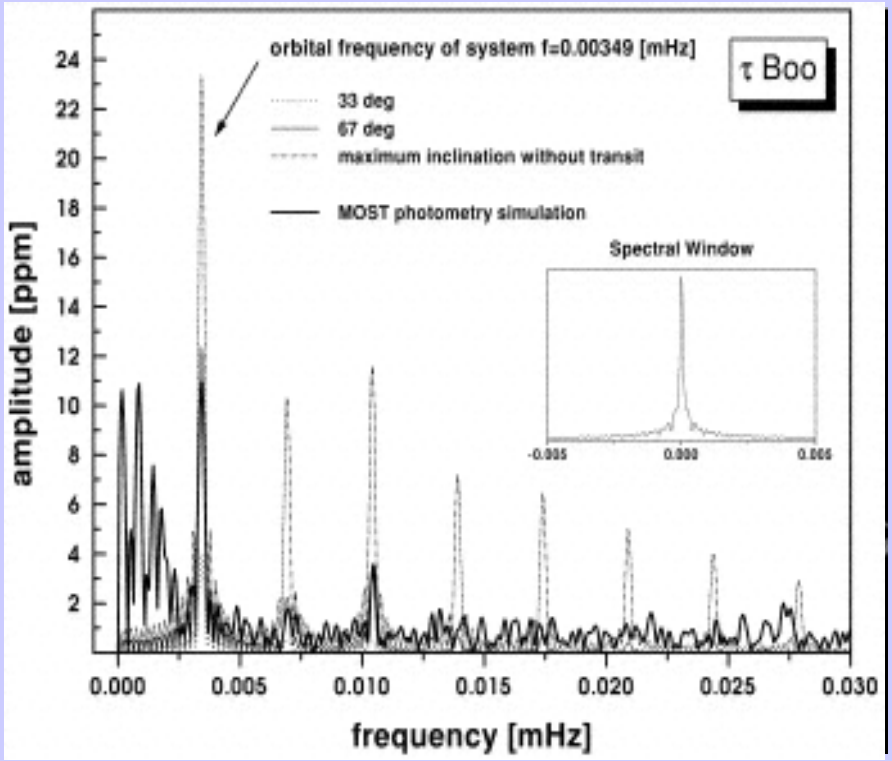
50 objects surveyed simultaneously

Open Clusters efficiently surveyed



Searching the *KEPLER* mission FOV.



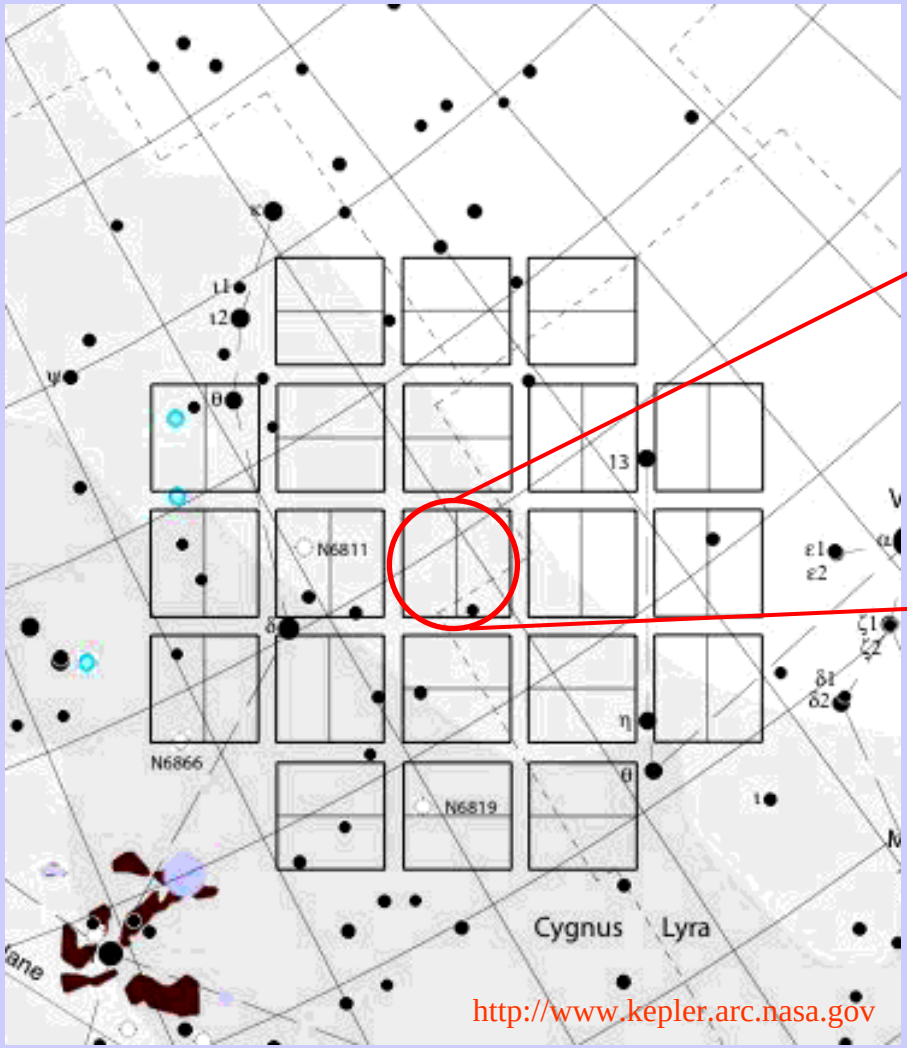


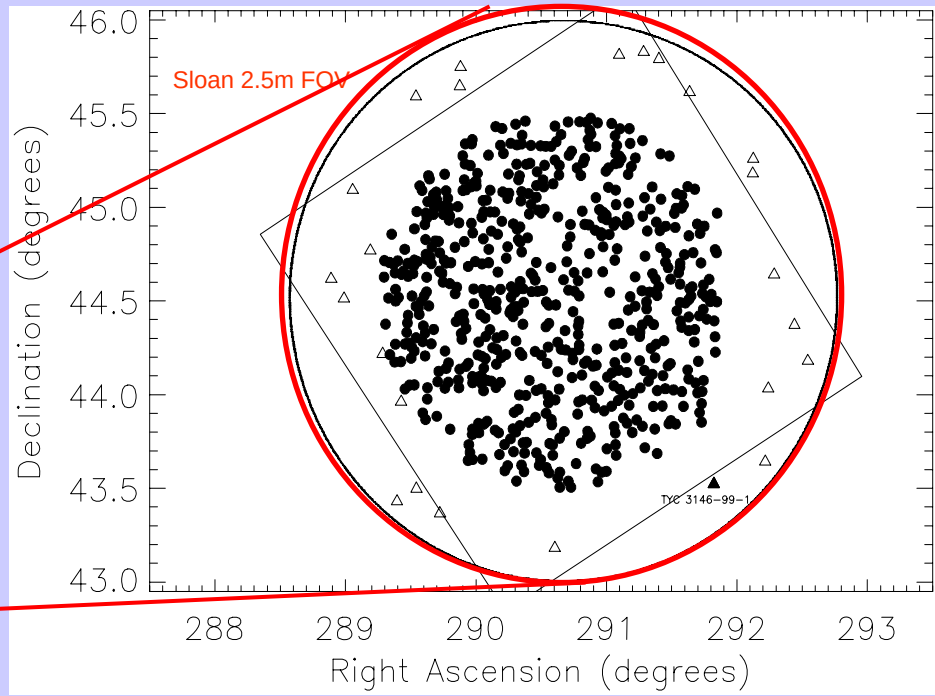
Gurdemir et al. 2005

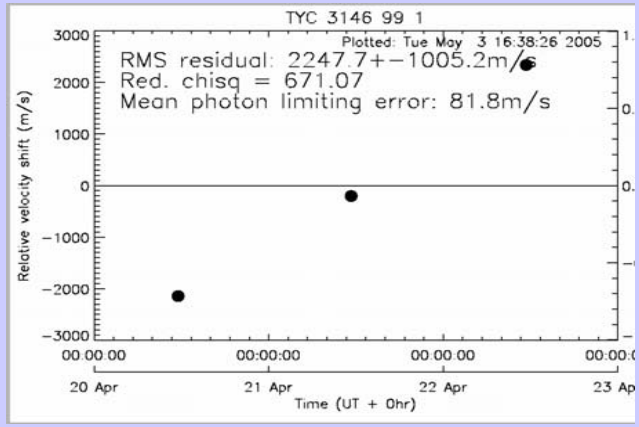
Can also discover non-transiting hot Jupiters by Reflected Light

Searching the *KEPLER* mission FOV.

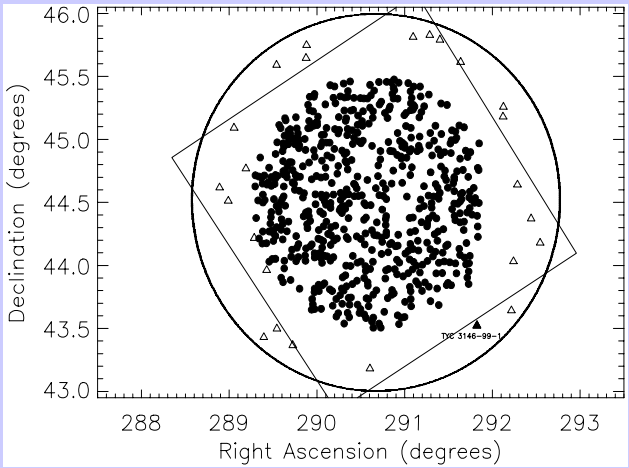
April 2005



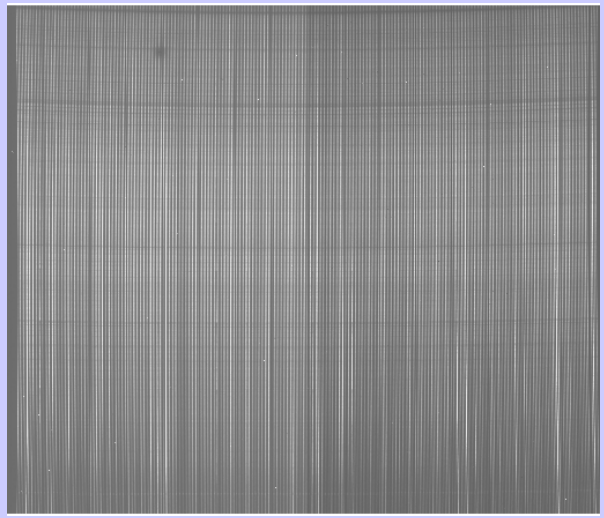


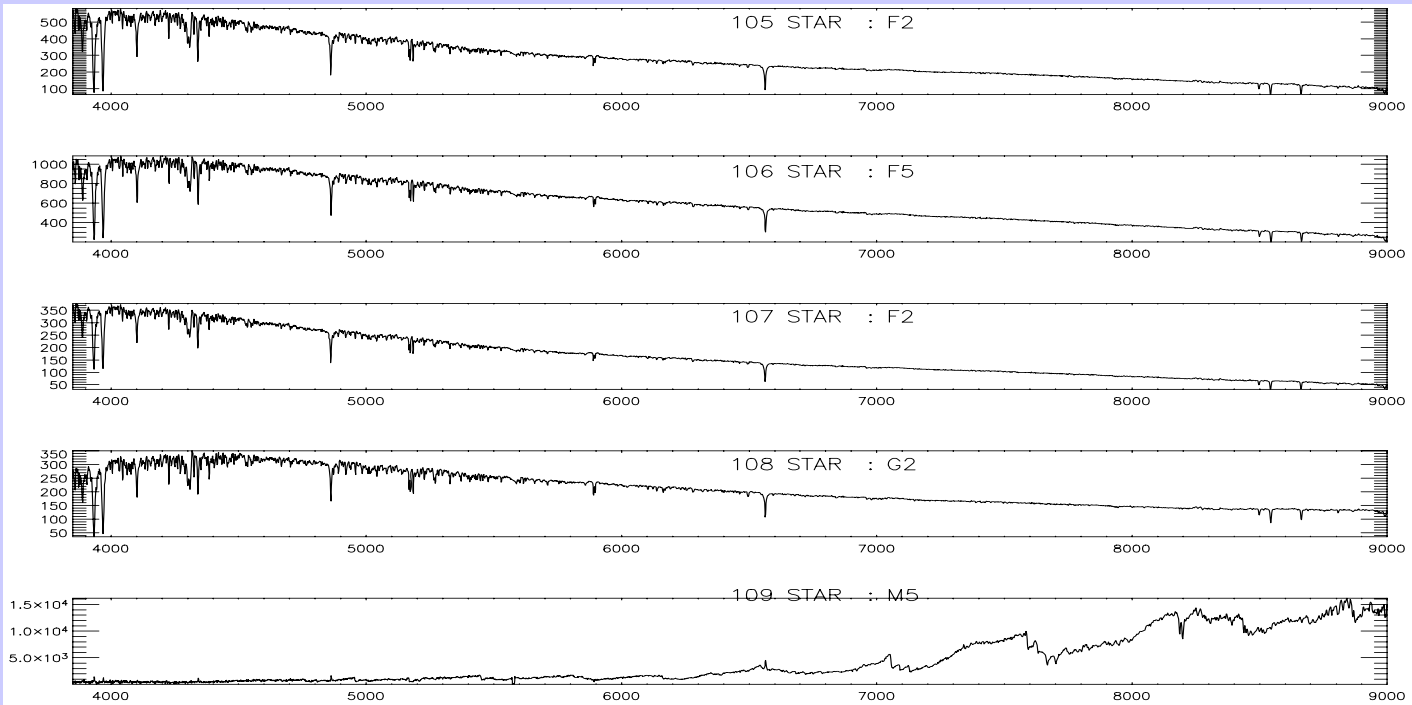


Searching the *KEPLER* mission FOV.



SDSS Spectrographs used simultaneously with the multi-object instrument- 640 spectra in the Kepler field.





Goal

2000 stars searched

10-20 hot Jupiters

30-60 other planets

Spectra for 10-20k stars.