Room 131:

9:30AM - Introduction
9:40-10:40AM - SpeX Upgrade/Discussion
10:40-11:00AM - Break
11:00-12:30PM - iSHELL presentation

12:30-01:30PM - lunch at Imiloa

Auditorium:

01:30-03:00PM - General discussion

Room 210:

03:00-04:30PM - ASIC discussion

Parking lot:

04:30PM – pupus and drinks

iSHELL Presentation Outline

1) General description of iSHELL (30 min)
   -General Description and science objectives (Alan)

2) Rough Budget and Schedule (15 min)
   -Budget and schedule from proposal (Tim)

3) Project Management / Coordination (25 min)
   -Management approach and collaboration tools (Tim
   -Work Breakdown Structure (WBS) approach (Tim)

4) Current and Near-Term Work (30 min.)
   -Science Requirements Document (SRD) (John)
   -Purchase of Science Grade Array (Alan)
   -Optical Design (John)
   -Immersion grating studies (Alan)
   -New Hires (Alan)

5) Long Term Plans (10 min.)
   -Role of staff at the IRTF (Alan)
   -Final integration, testing, commissioning (Alan)

6) Discussion / Questions

Immersion Grating Echelle Spectrograph

(iSHELL)

iSHELL

- Since 2004, Tim and I have submitted proposals to the NSF Advanced Technology and Instrumentation (ATI) program to build an instrument to replace CSHELL (Cryogenic Echelle Spectrograph).
- CSHELL is already nearly 18 years old!
- In 2007 we switched to the NSF Major Research Instrumentation (MRI) program and got $2.0 million for the construction of iSHELL.
- Funding started on Aug. 15.
- But we need $4 million. Will get about $1.2 million from NASA and $265K from UH. We will commit about $700K from IRTF operations. Baseline is about 4 years to complete the instrument.

iSHELL

iSHELL will be the *only* 1-5 micron spectrograph with high spectral resolution in the Northern Hemisphere.

- Tim is the project manager and he has begun the planning process for construction of this instrument: a work breakdown of the project was completed and we will construct a schedule and budget.
- John Rayner will be the Project Scientist until we can hire a post-doc for this position.
- John has written a comprehensive science requirements document. We will ask the science group that helped us write the proposal to finalize the science requirements.

Co-Investigators

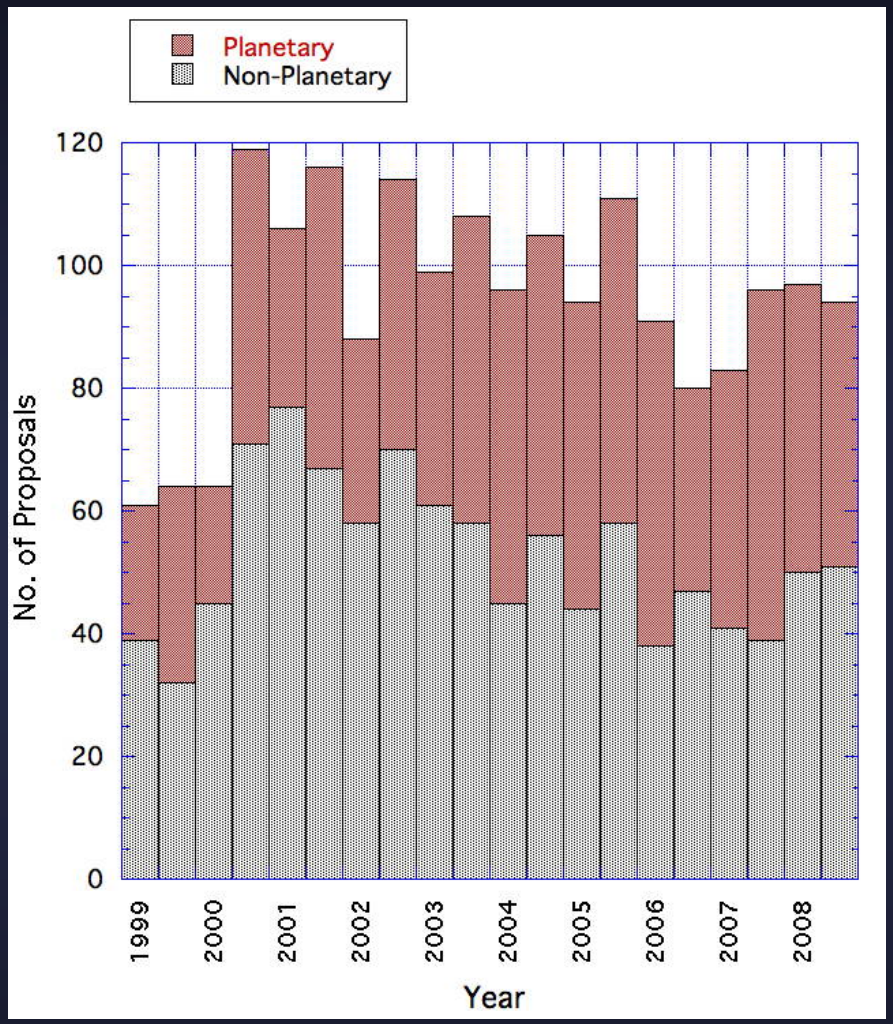
- Dan Jaffe, Univ. of Texas at Austin. Will provide the immersion grating. Protostellar evolution.
- Mike Mumma, Goddard. Will provide 512x512 slit guider array. Comets, planetary atmospheres.
- John Rayner, IFA. Will be initial project scientist. Spectrograph design expert.
- Eric Tollestrup, IFA. Will provide detector expertise.

Science Areas

- Composition of comets
- Planetary atmospheres- Mars, magnetospheres of outer planets
- spectroscopy of exoplanets
- protostellar evolution
- young stellar binaries
- magnetic fields and rotation of young stars
- preplanetary disks

C. Allende-Prieto (U. of Texas), G. Bjoraker (Goddard Space Flight Center), J. Carr (Naval Research Lab), N. Dello Russo (Johns Hopkins/APL), D. Deming (GSFC), M. DiSanti (GSFC), D. Jaffe (U. of Texas), L. Keller (Ithaca College), V. Krasnopolsky (Catholic U. of America), K. Magee-Sauer (Rowan Univ.), S. Miller (Univ. College London), M. Mumma (GSFC), J. Najita (NOAO), R. Novak (Iona College), L. Prato (Lowell Obs.), M. Simon (SUNY Stony Brook), and T. Stallard (Univ. College London)

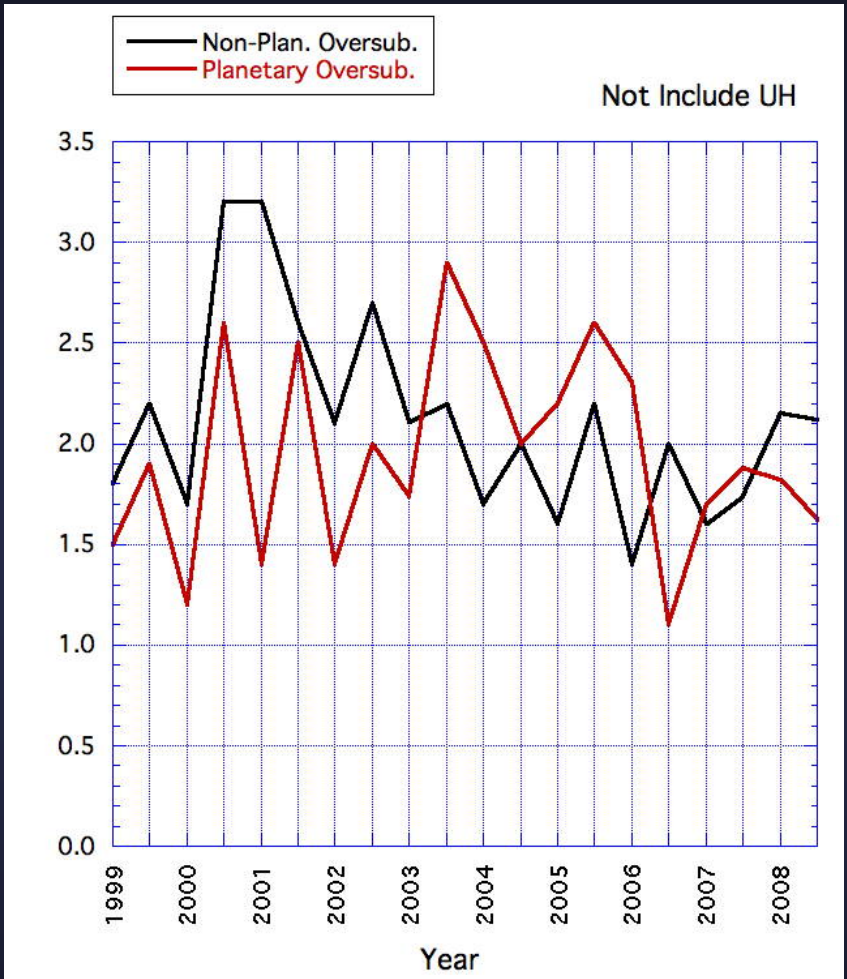
No. of Proposals



Note big jump in number of proposals in 2000. This was due to SpeX coming online.

We need similar impact when iSHELL is completed to ensure operations beyond 2013.

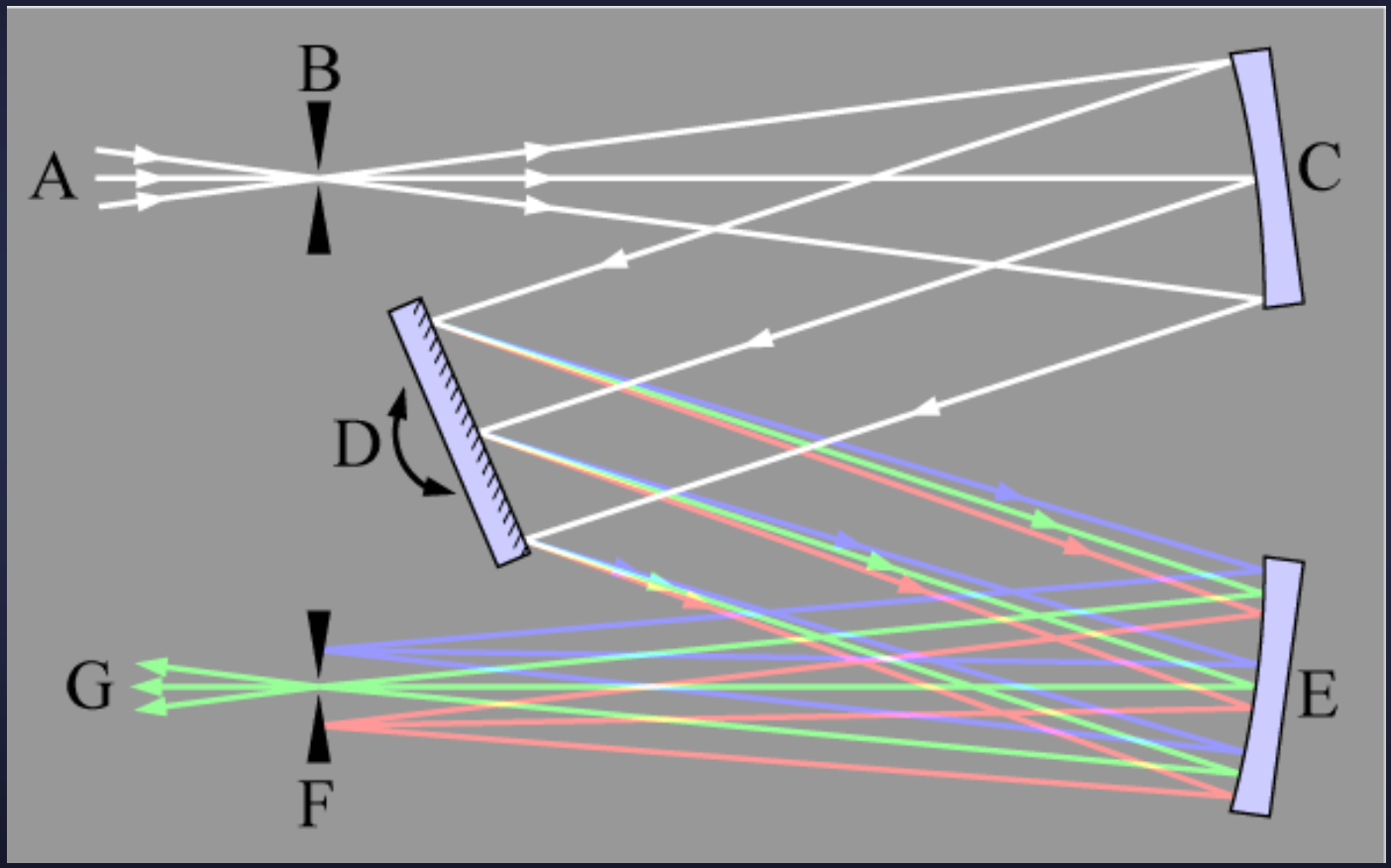
Oversubscription



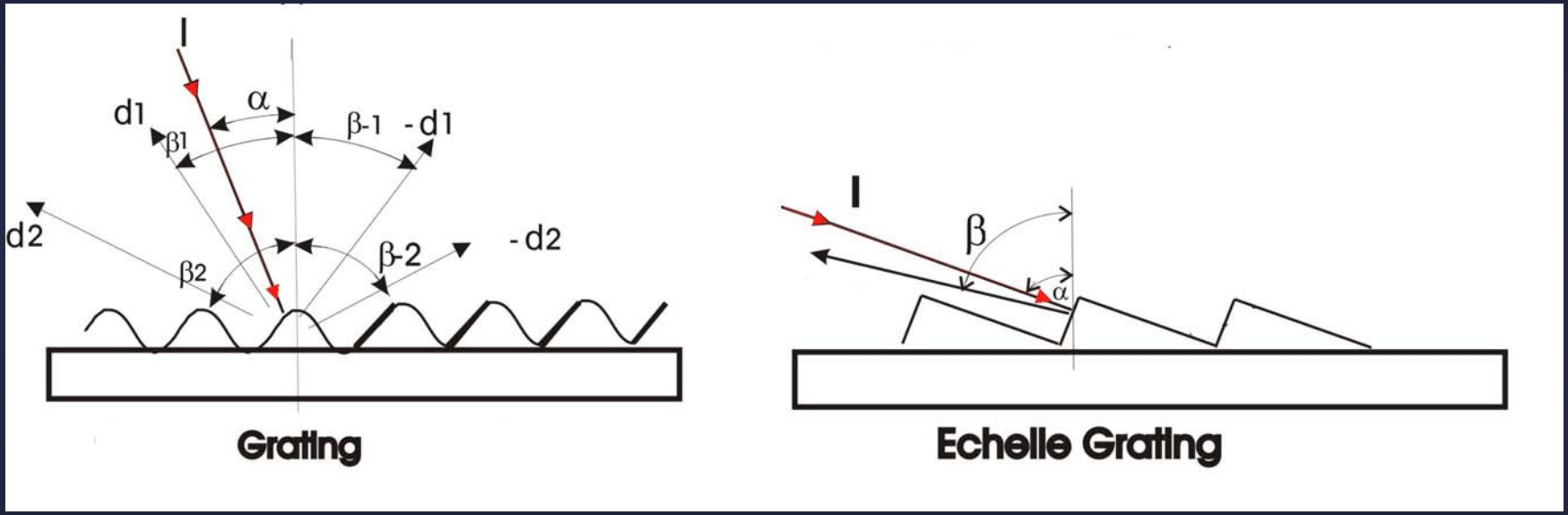
Oversubscription is holding steady. This is a measure of how much the telescope is in demand.

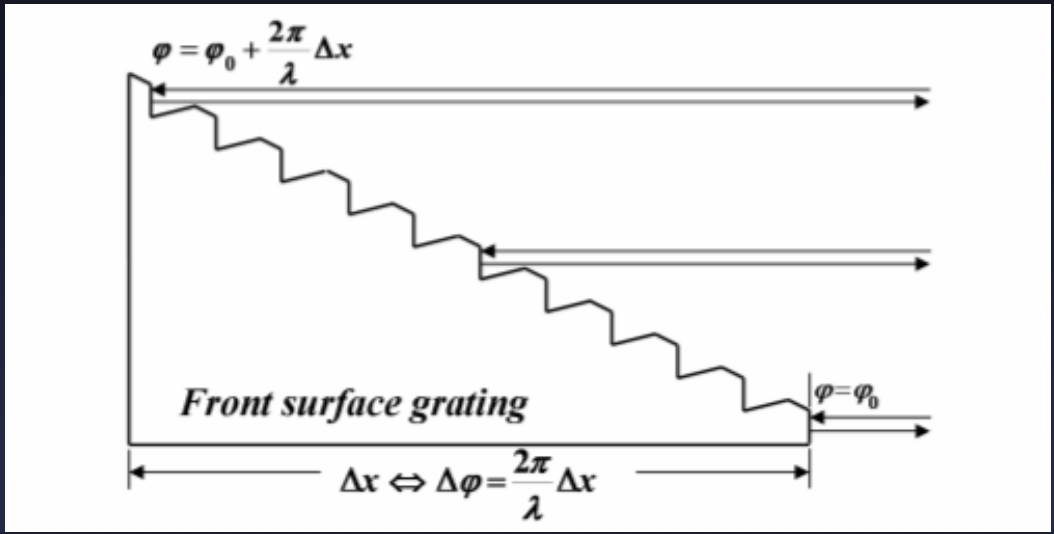
1.5-2.0 is typical for healthy observatory. Can be as high as 6-7 for very high demand observatories, such as Hubble Space Telescope or new facilities.

What is a spectrograph?

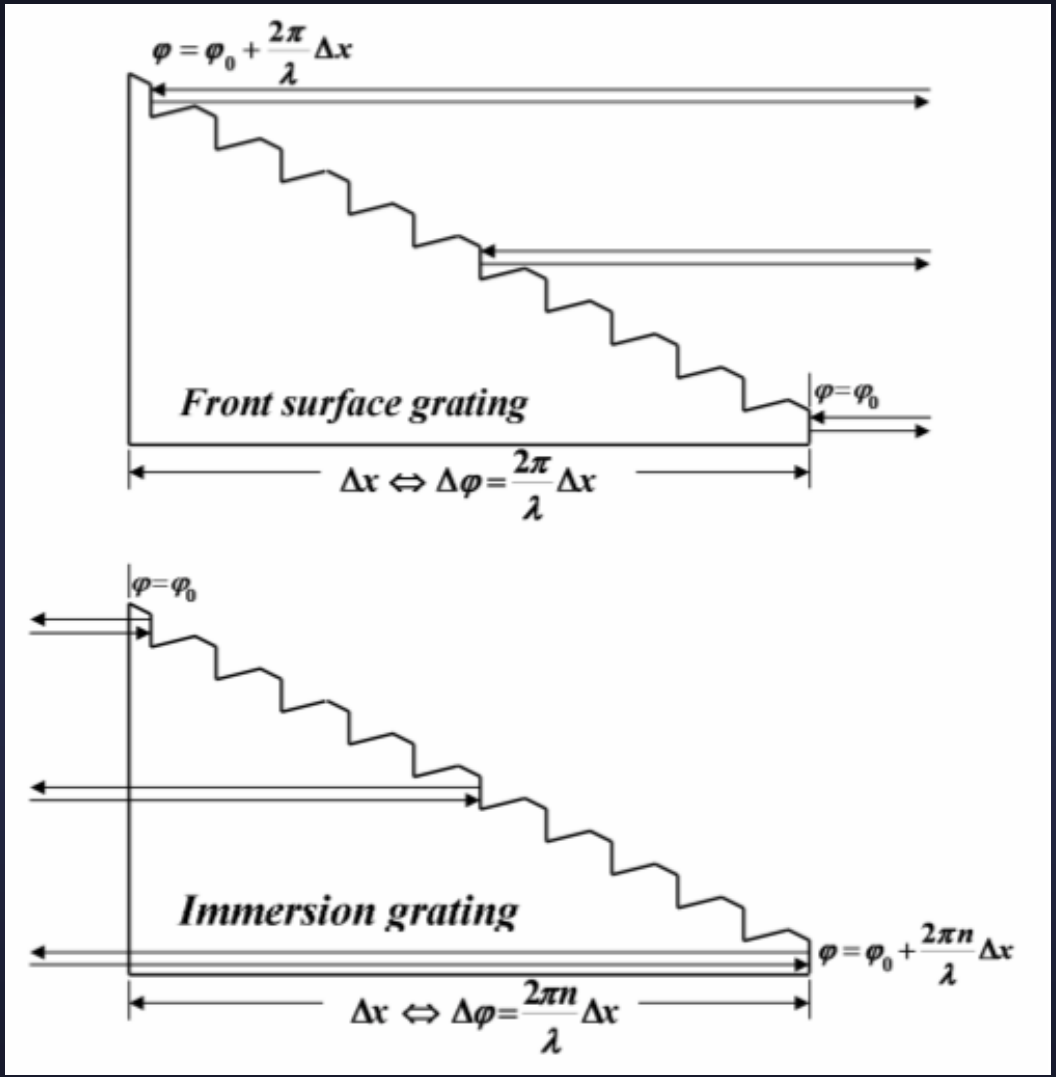


What is an Echelle grating?



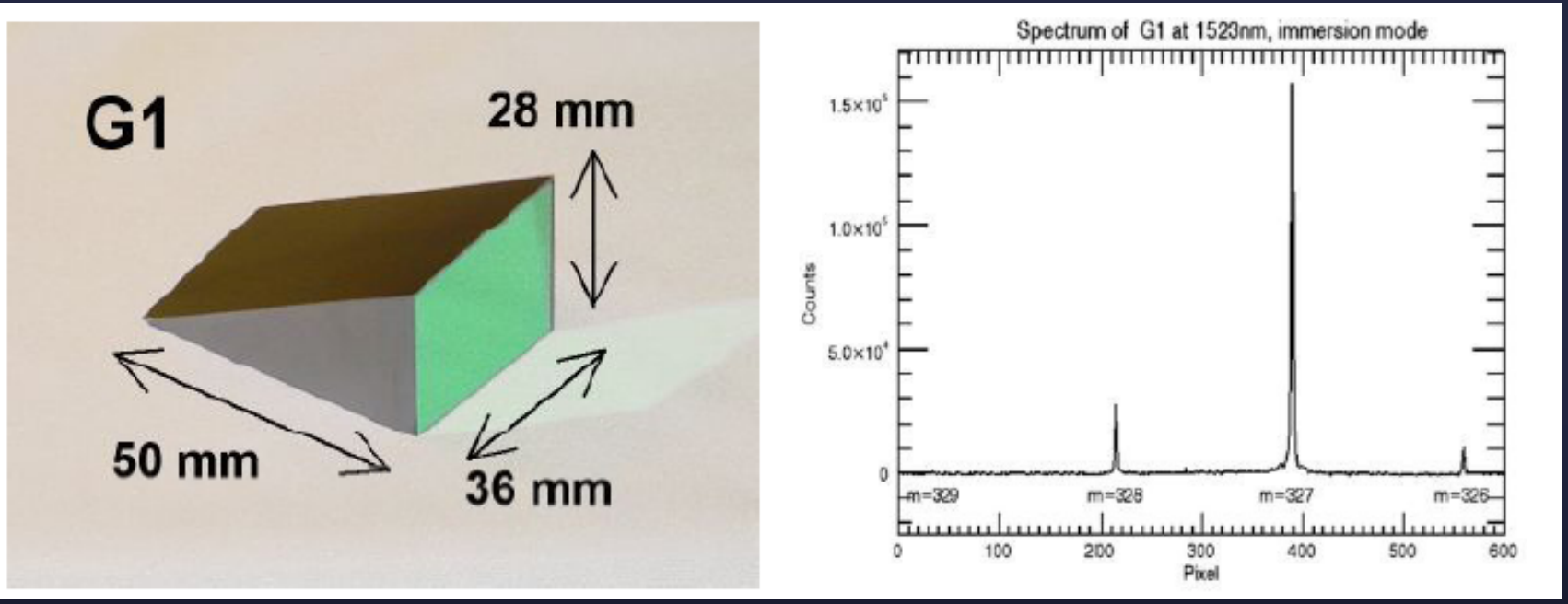


What is an immersion grating ?

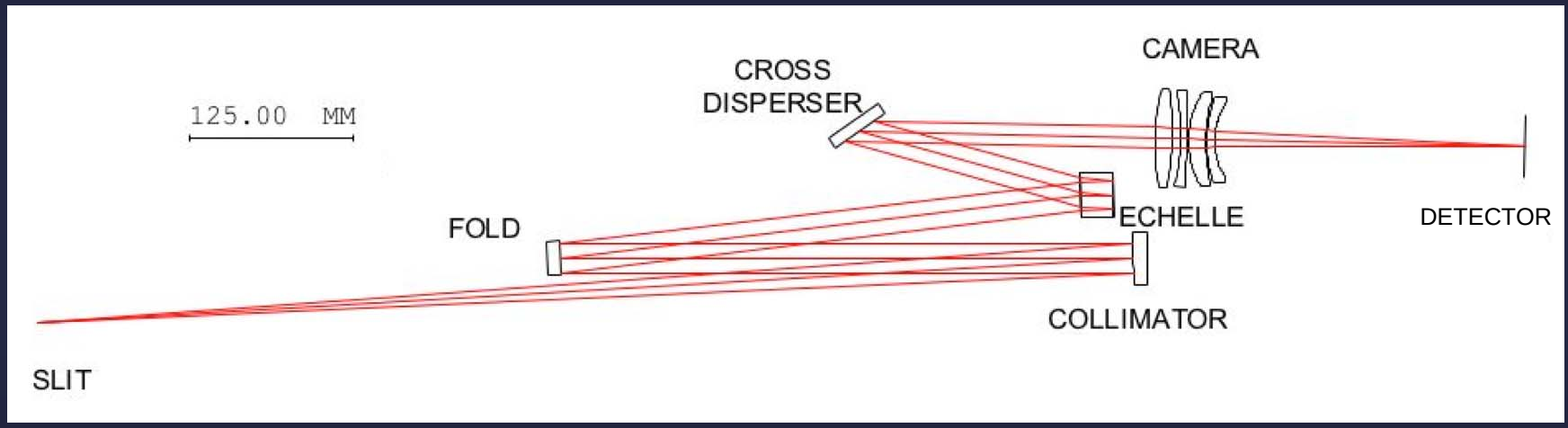


What is an immersion grating ?

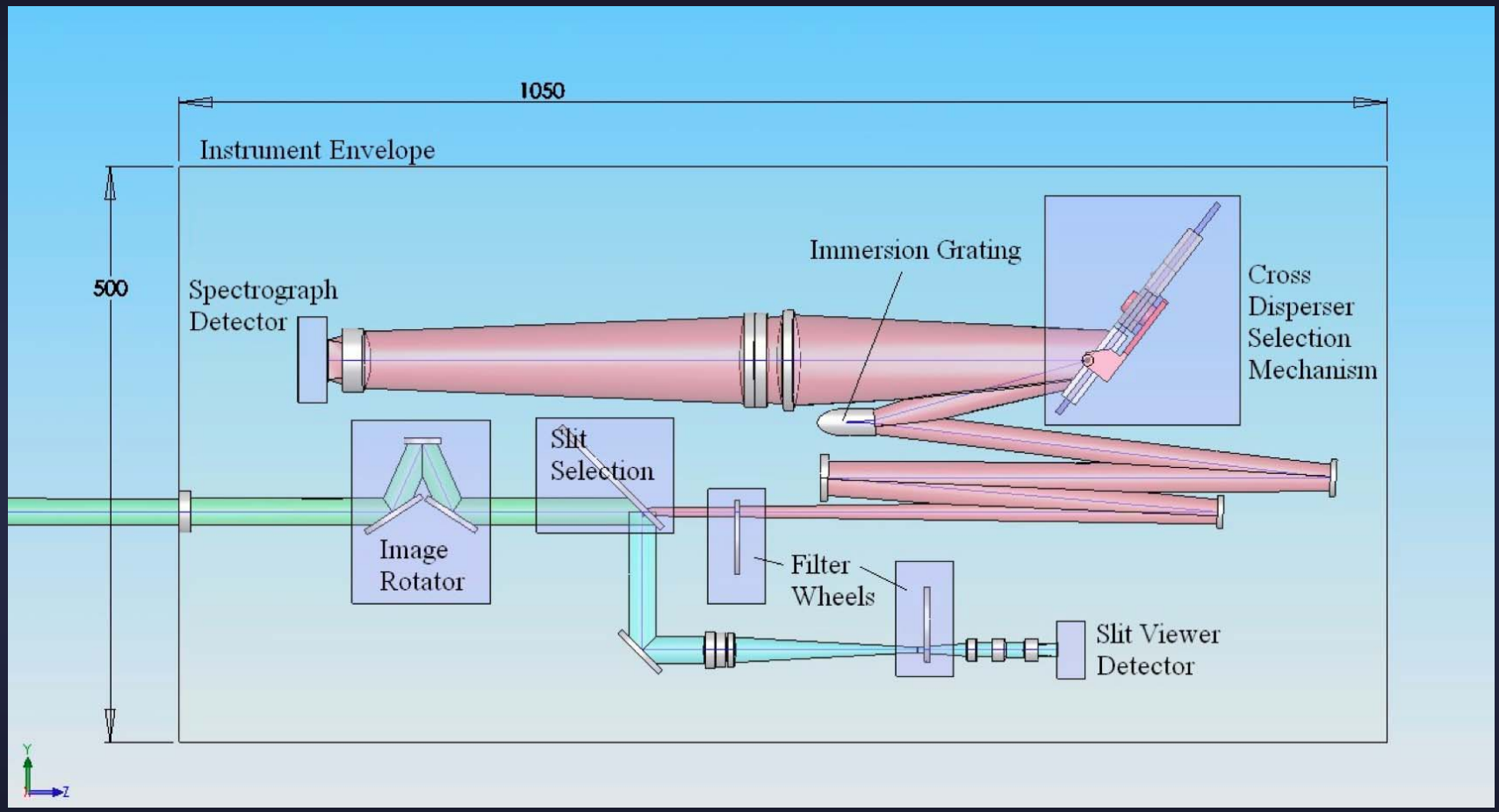
Immersion grating already made and tested. An improved immersion grating will be made soon.



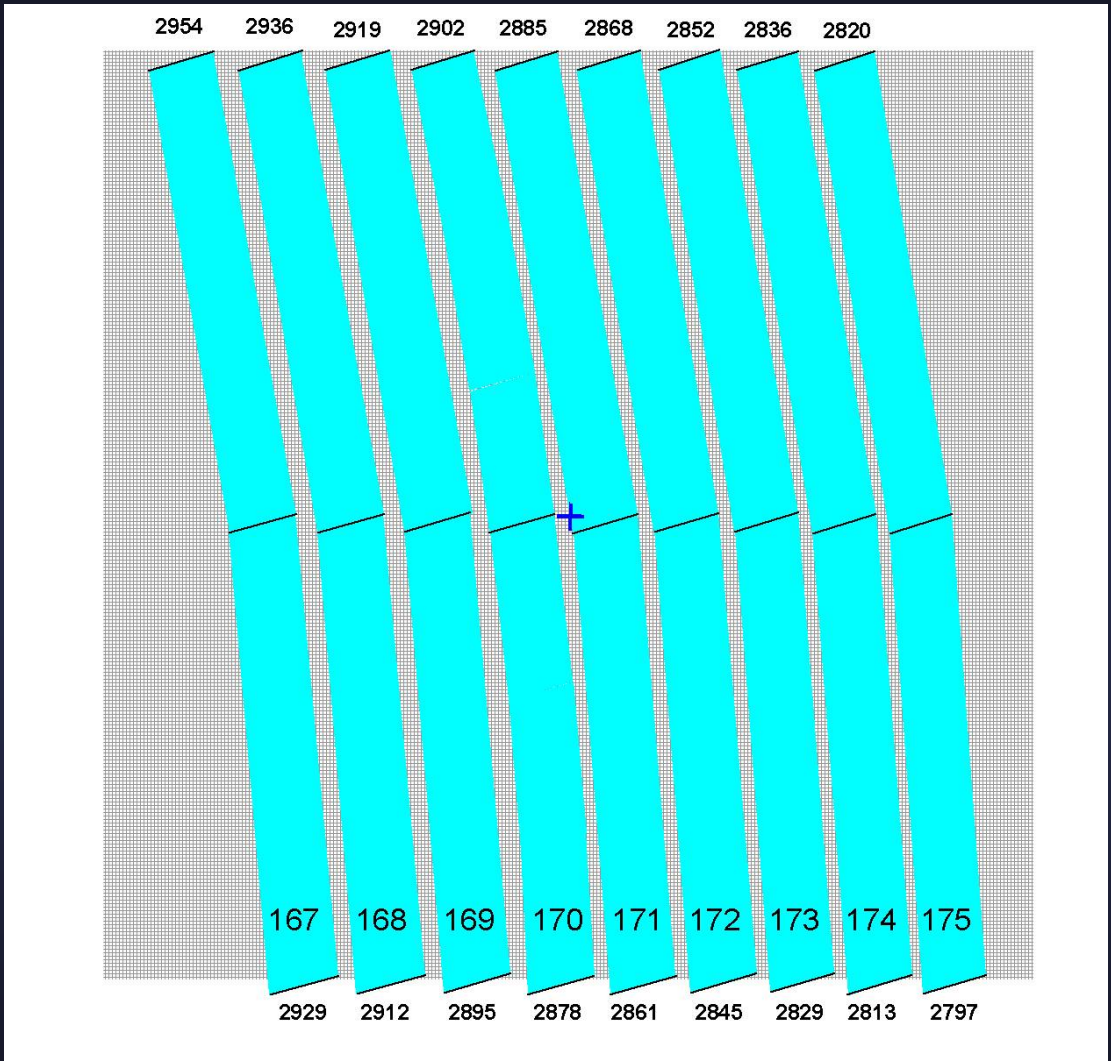
Optical Layout of iSHELL



Spectrograph Layout



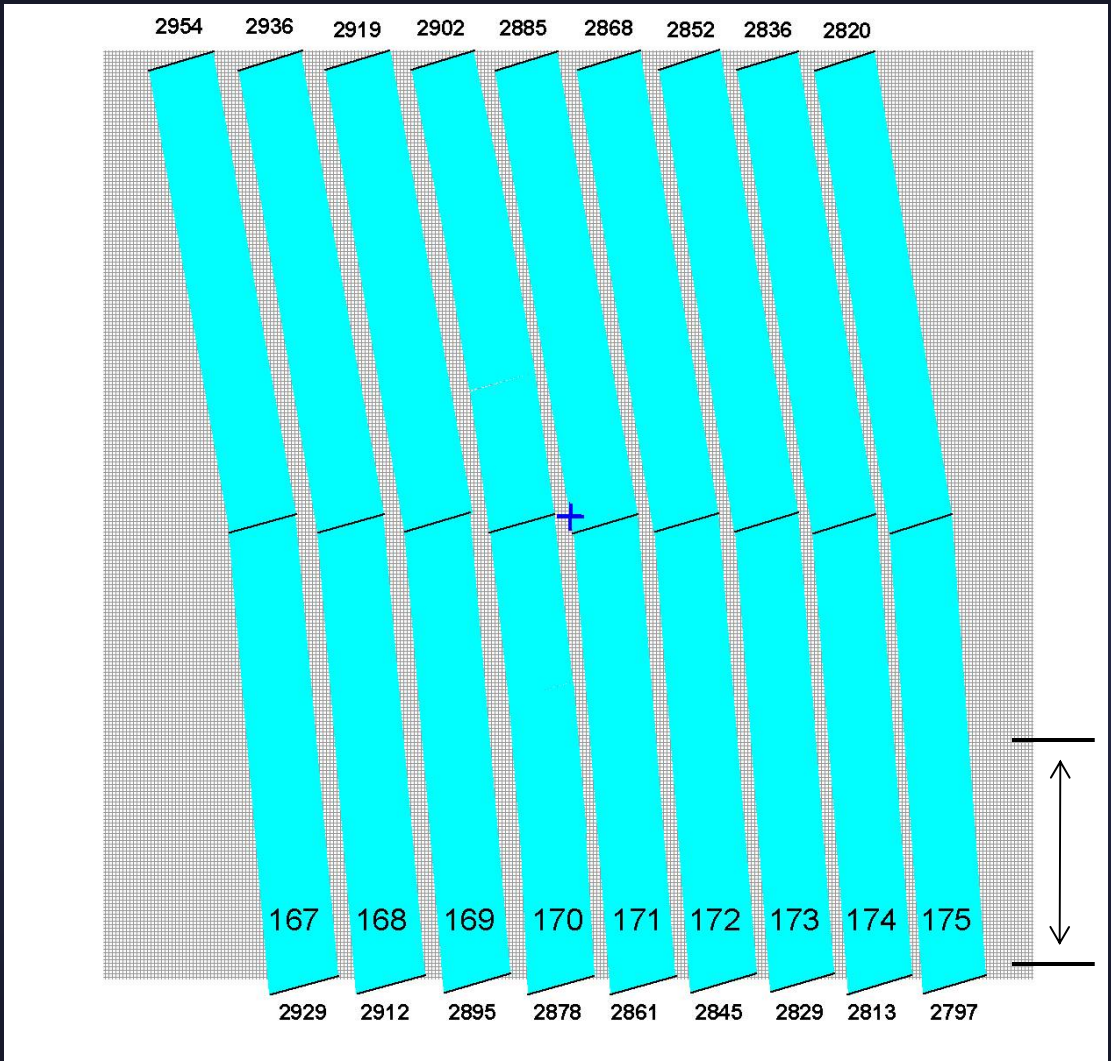
Optical design already done but we will refine the design after review of the science requirements.



Order layout for L-band exposure (2.797-2.954 microns).

Echelle orders are 167-175.

Slit length is 15.3 arc-seconds.



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CSHELL spectra range

Table 1. Spectrograph properties

Slit width	0.25″-- 1.0″
Slit length	≥ 5″ @ H, K; ≥ 15″ @ L, M
Resolving power	80,000 at 2.0 μm; 67,000 at 3.5 μm
Collimated beam	22 mm diameter
Collimator focal length	838 mm
Camera focal length	320 mm
Silicon immersion grating	60 mm length, 63.5 deg. blaze 12.5 grooves/mm
Detector	2048x2048 InSb, 0.083″/pixel
Optics temperature	70K
Detector temperature	~30K

Science Areas

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- Planetary atmospheres- Mars, magnetospheres of outer planets
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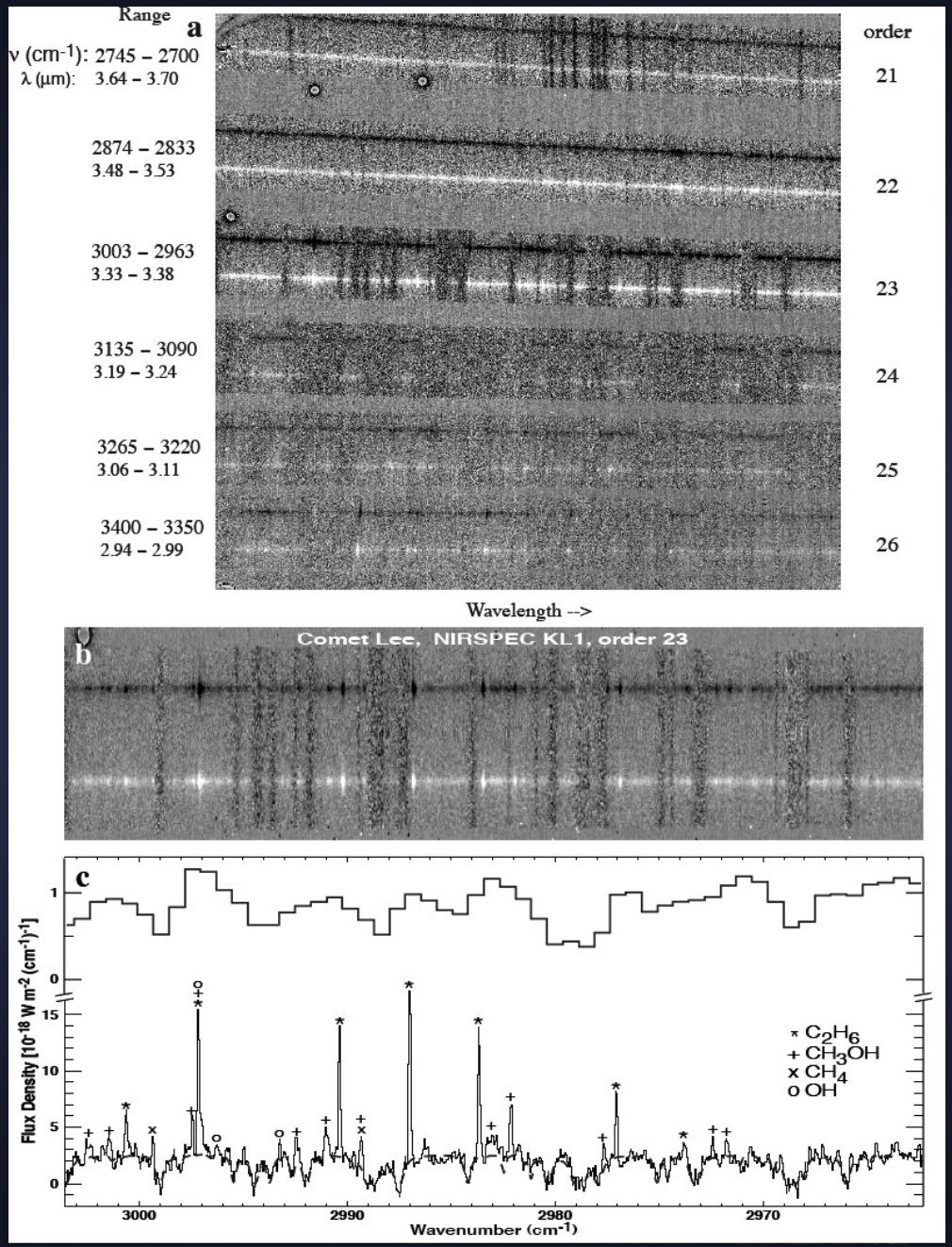
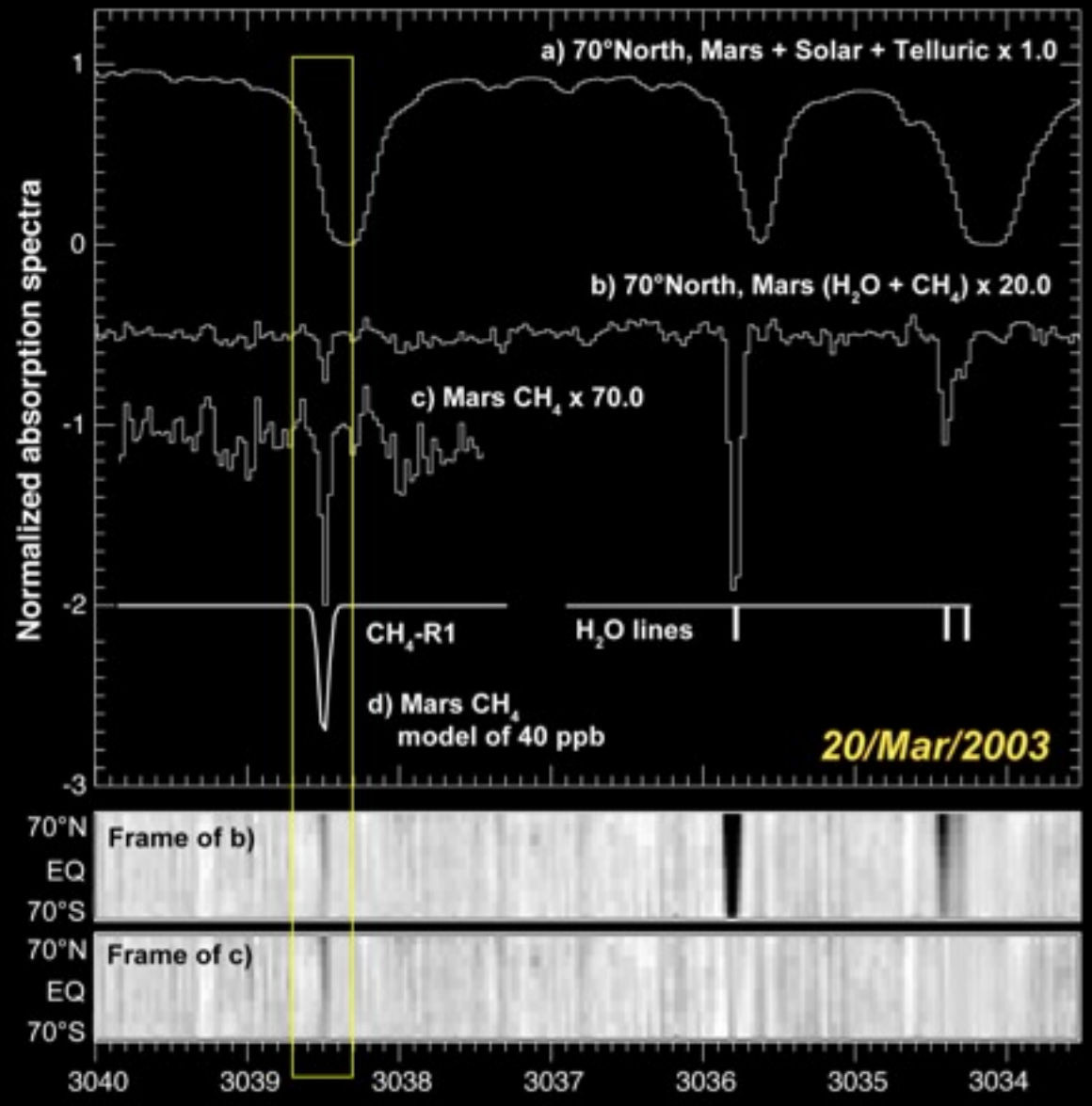
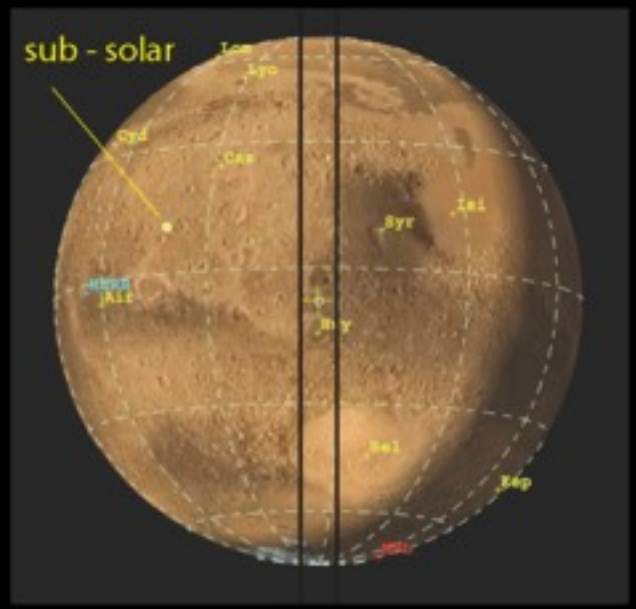


Example Spectrum

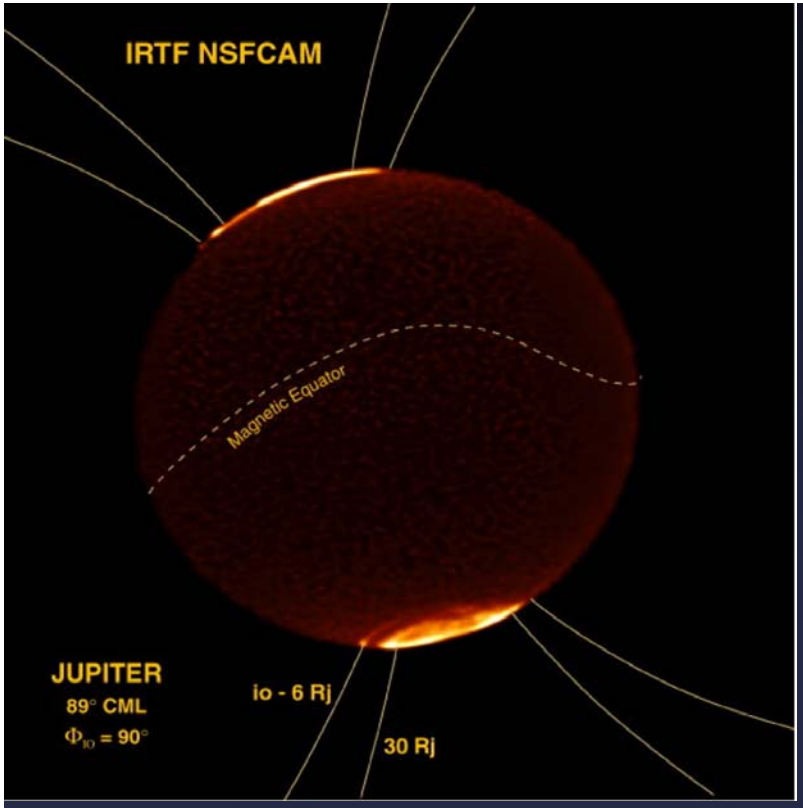
Spectrum of a comet taken with NIRSPEC on Keck.

Example 2: Detection of Methane on Mars

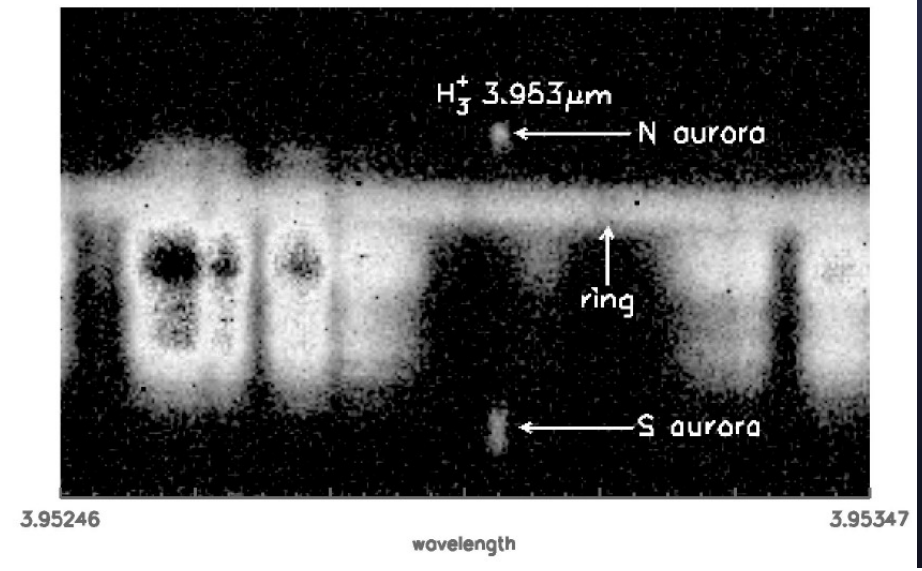




Aurora on Jupiter and Saturn

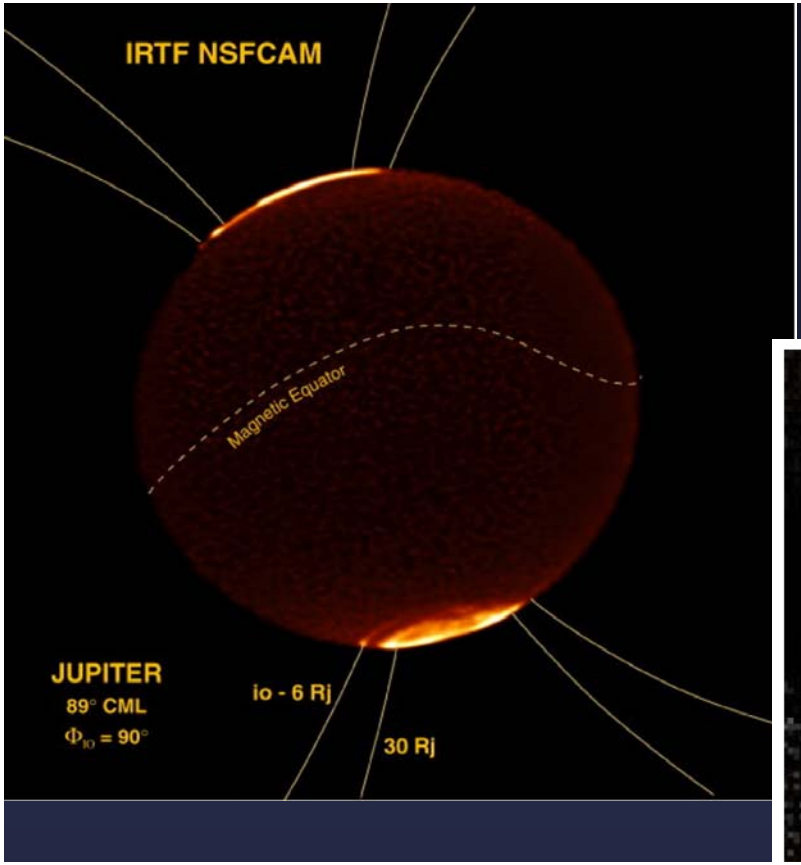


NSFCAM2 image of Jupiter



CSHELL spectrum of Saturn

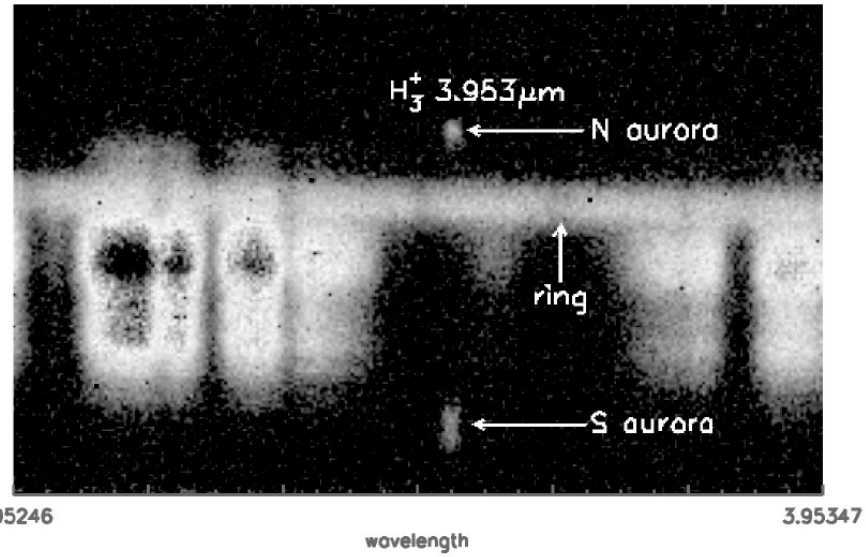
Aurora on Jupiter and Saturn



Jupiter- CVF image

Jupiter- CSHELL slit scan image

Saturn- CSHELL slit scan image



CSHELL spectrum of Saturn

Summary

- iSHELL will provide unique observing capability in the Northern Hemisphere.
- It will help to greatly ensure continued IRTF operations.
- It will be first immersion grating spectrograph.
- It will utilize a state of the art 2048x2048 infrared array.
- Altogether, iSHELL will keep the IRTF at the scientific and technical forefront.