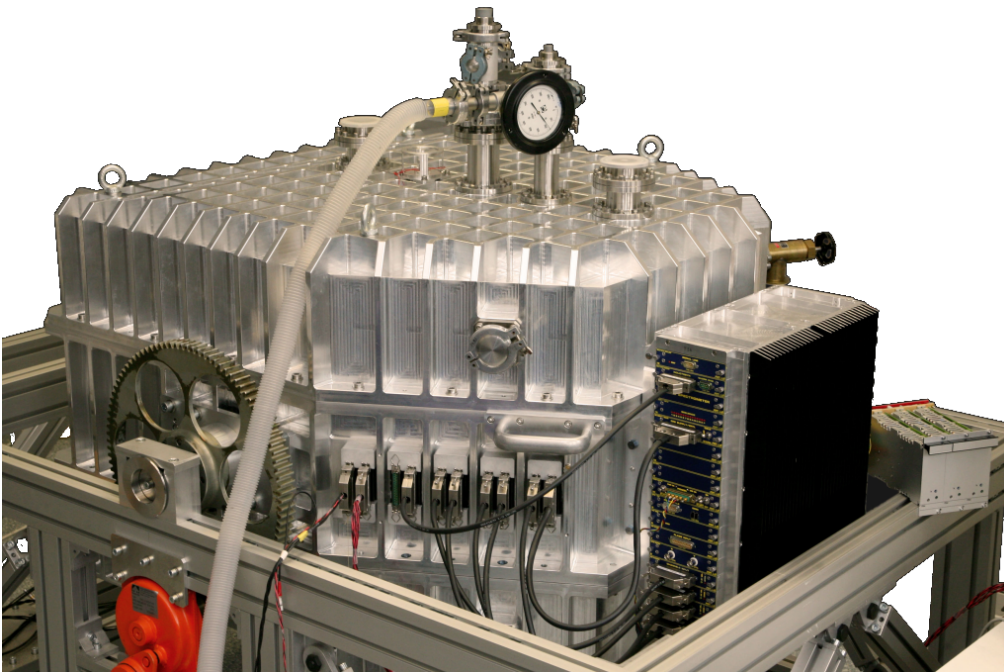


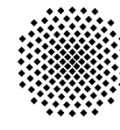
FIFI-LS

Status Report



Randolf Klein
USRA

S. Colditz, C. Fischer, F. Fumi, N. Geis, R. Hönle, A. Krabbe,
L. Looney, A. Poglitsch, W. Raab, F. Rebell, M. Savage







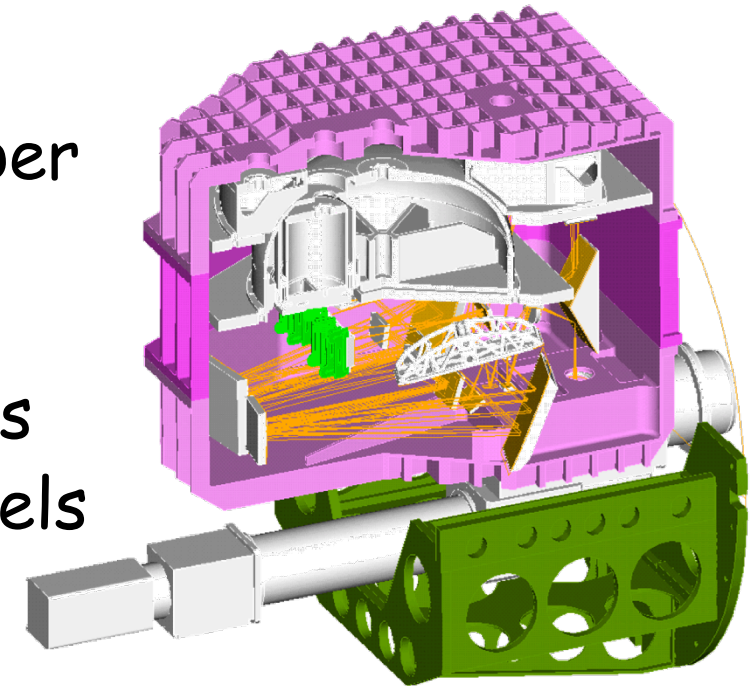
Outline

- **FIFI-LS overview**
- **Instrument status**
- **Milestones towards first flight**

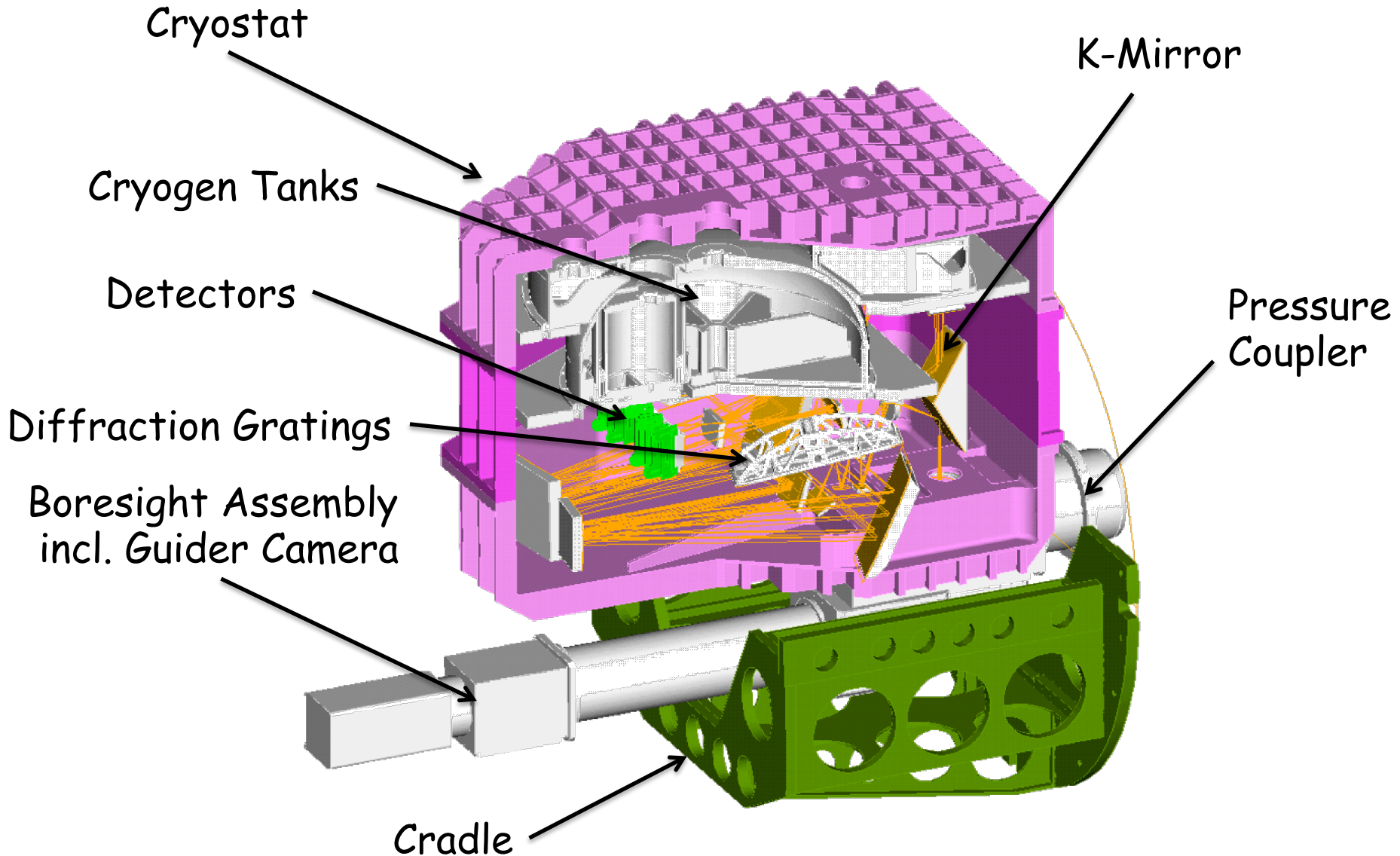


FIFI LS: the Field-Imaging Far-Infrared Line Spectrometer

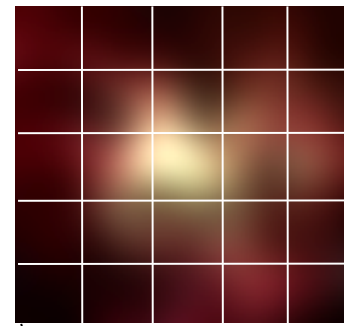
- Far-infrared spectrometer employing two parallel channels:
 - Blue 42-110 mm
 5x5 pixel field of view: 6" per (spatial) pixel
 - Red 110-210 mm
 5x5 pixel field of view: 12" per spatial pixel
- Imaging spectrometer concept
 - Each channel  5x5 spatial pixels
 - 16 spectral pixels per spatial pixels
- Mean spectral resolutions 
R=1000-3000



FIFI LS-Main Components

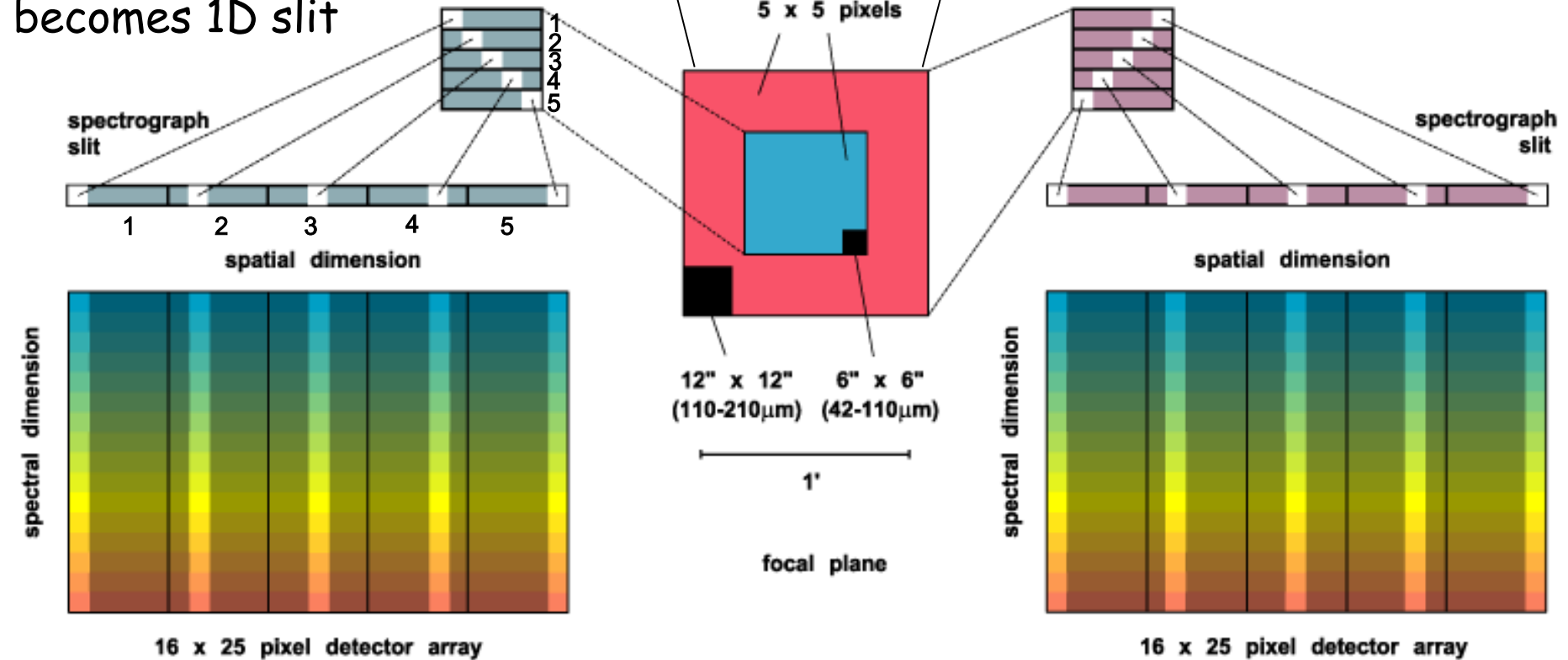


Integral Field Concept



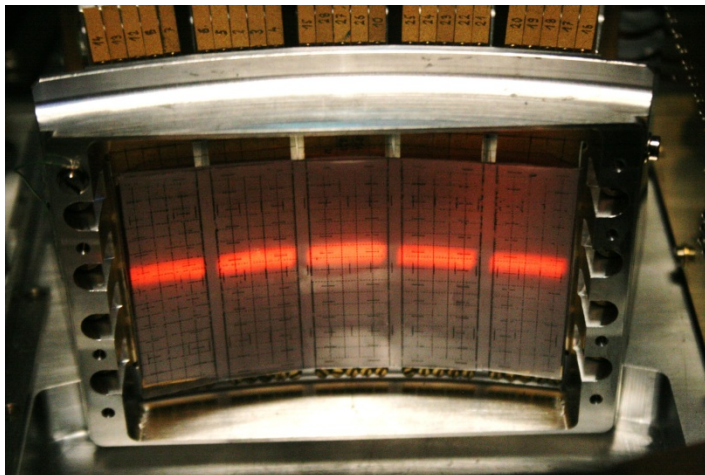
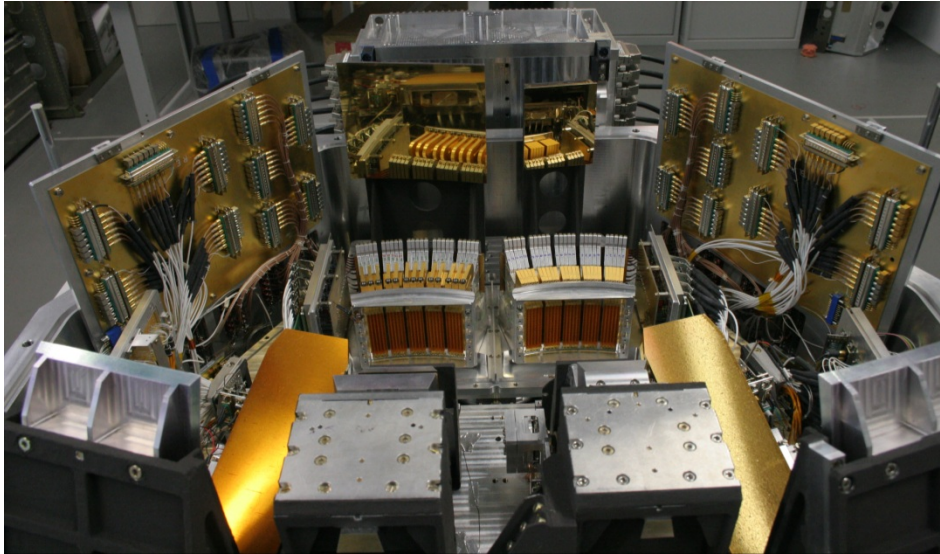
Footprint of Red and Blue channels are concentric





2D field of view becomes 1D slit






2D detector contains 3D data cube

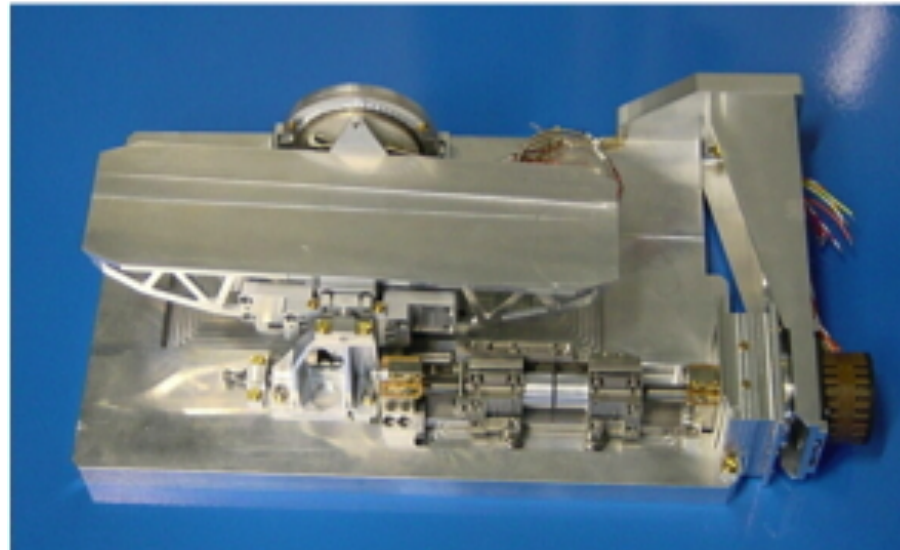
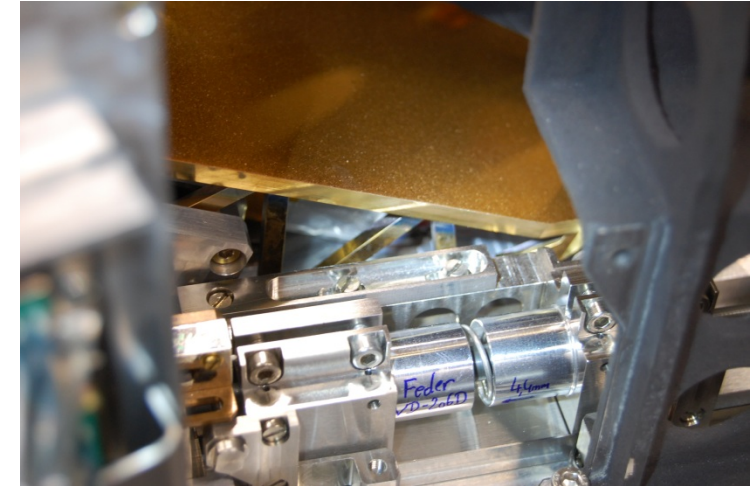
Instrument Status - Optics



- Red channel  integration complete, characterization done
- Blue Channel  integration complete, alignment done, characterization started
light leak detected
- K-mirror and internal calibration source  integration complete, characterization started
- Boresight assembly  is currently being integrated





Instrument Status - Mechanisms

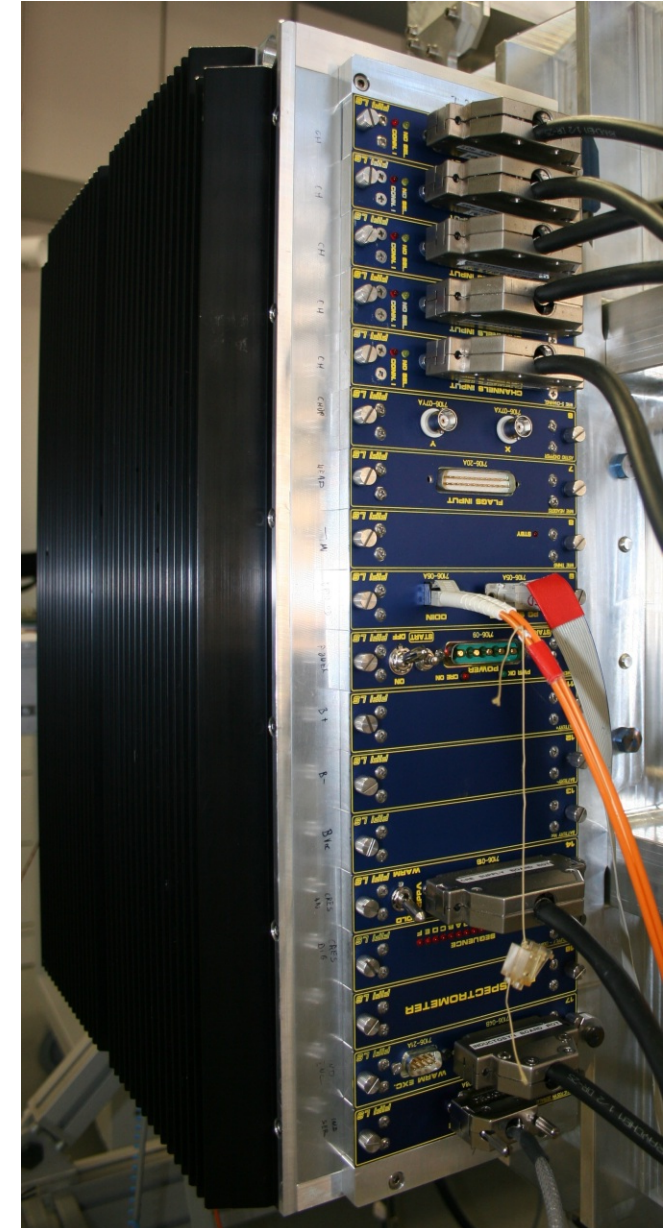
- New grating drives installed and tested in both channels 
Performance will be monitored
- K-Mirror mechanics  operational
- All filter changer mechanics  operational




 Mechanics are ready for flight

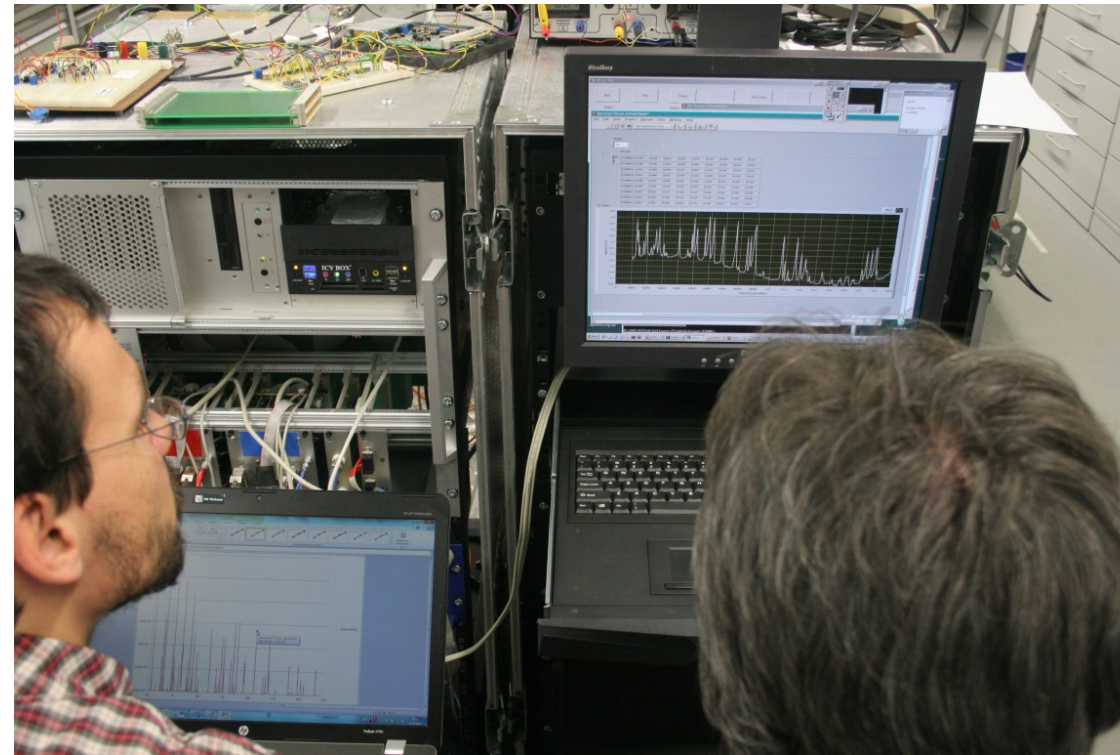
Status - Electronics

- Lab Set-Up  operational
- Cryostat Electronics backpack  flight ready
- CWR & PI-Rack  integration with flight-certified fasteners is underway
- Flight cables  all materials procured, integration proceeding - 70% finished

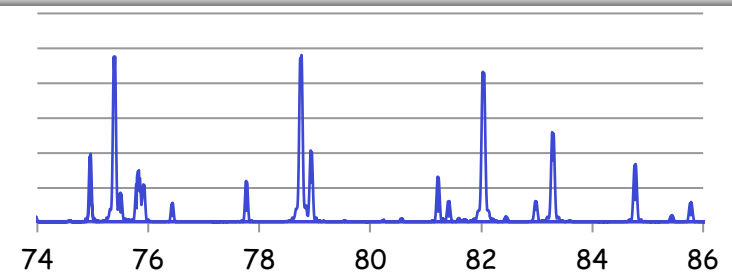
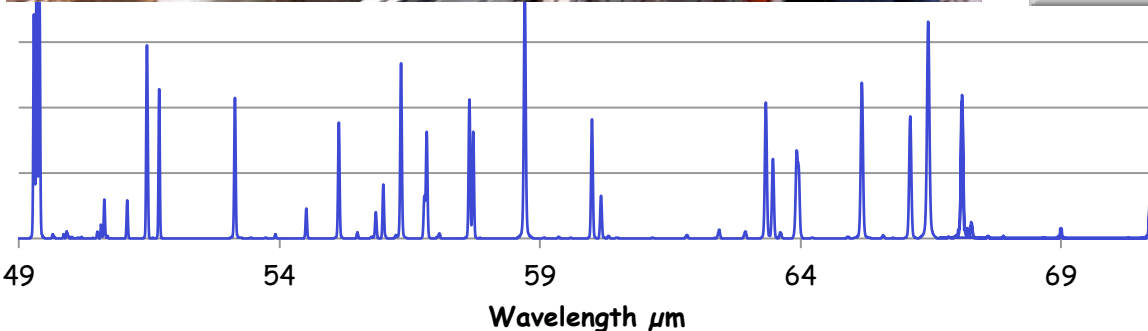
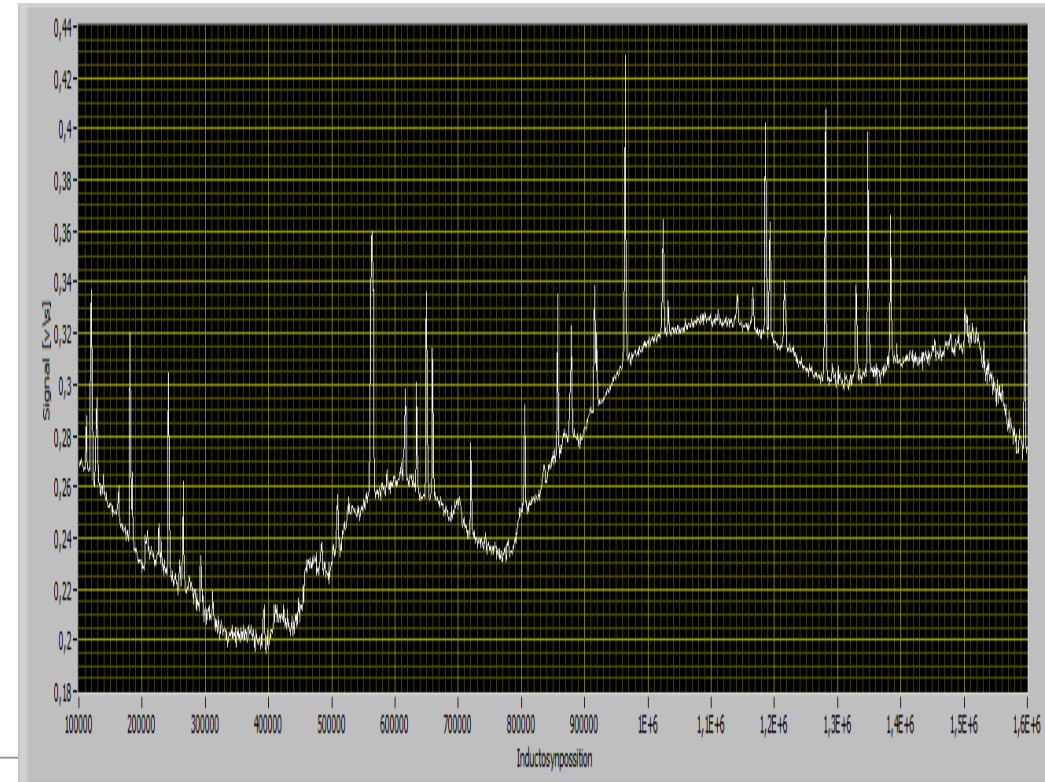


Status - Software

- Lab Set-Up  operational
- All mechanisms are controlled reliably
- Pipeline is continually updated with characterization results
- Integration of S/W control for all subsystem is under way
- The only missing module: Telescope control via KOSMA-translator



Status - Spectral Characterization

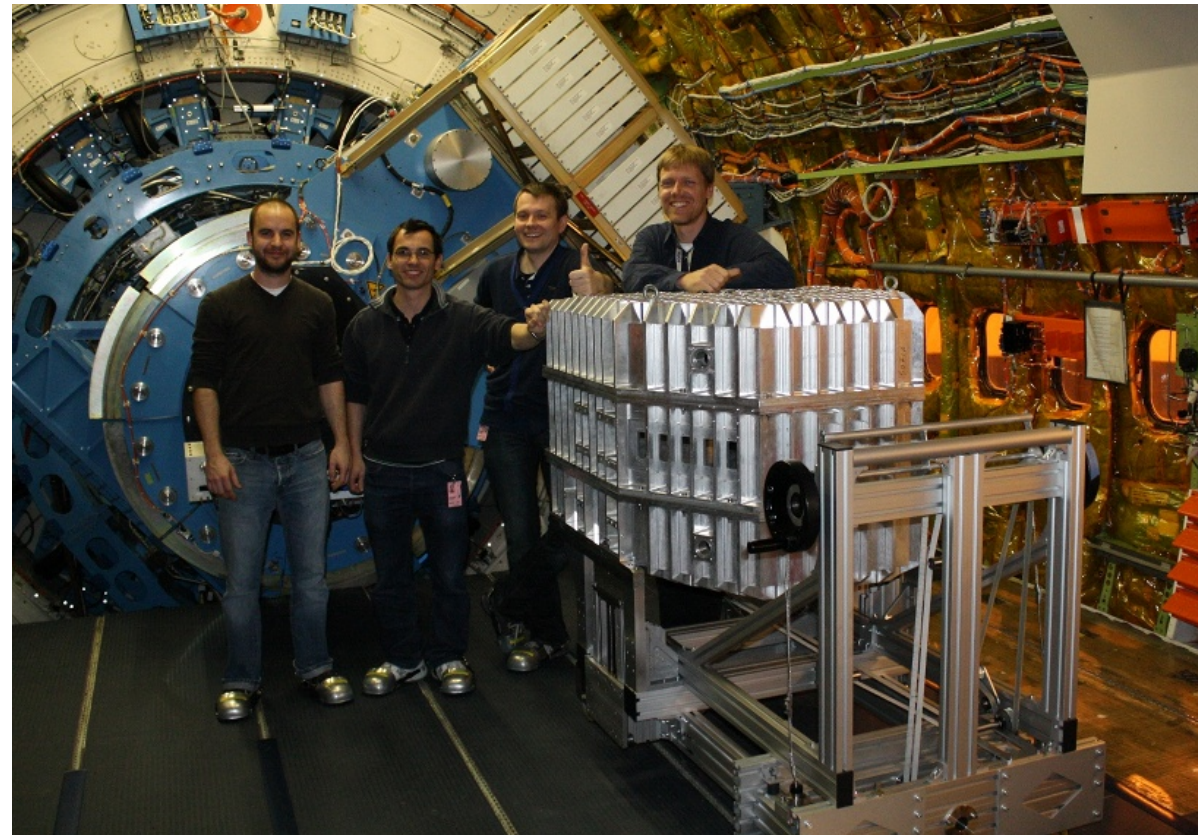
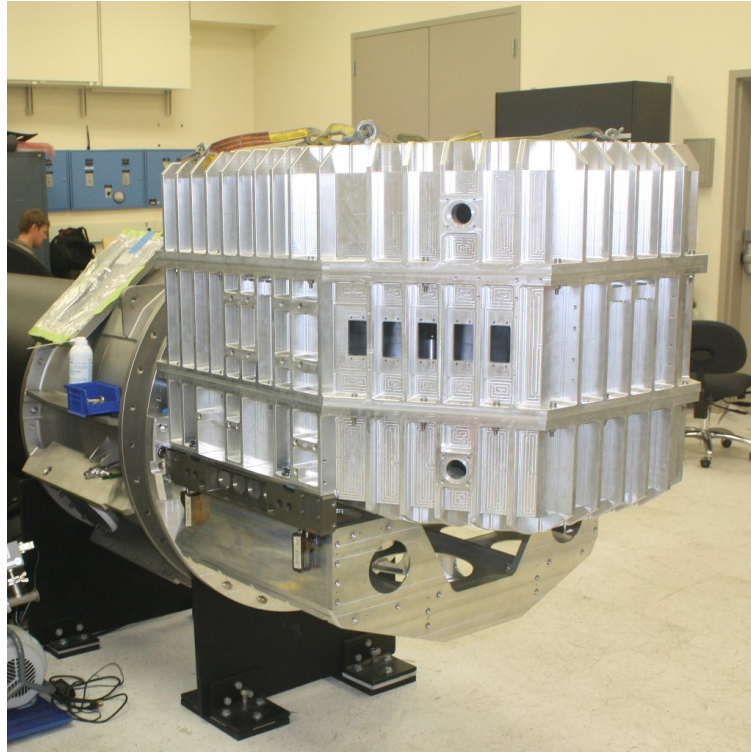


Blue Channel - Second Grating Order - Water Emmission in Air 10mBar

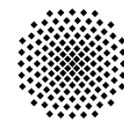
Fit check

Dec 2012:

- Load test of the FIFI-LS cart
- Mounted the FIFI-LS flight cradle and pressure coupler plus dummy cryostat onto the TAAS

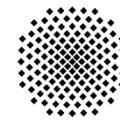


- Drove the cart with dummy onto SOFIA to the telescope



Milestones towards first flight

- Three major areas of work to be done:
 - Investigate the light leak in the blue channel.
 - Airworthiness documentation and certification
Two new documents submitted recently.
The only missing documents are the electronics document and the structural analysis of the rack-mounted parts.
 - Integration/Update of instrument control and data acquisition software
- July 2013 final airworthiness submission
- Late Oct 2013: Pre-shipment Review
- **Early 2014 First Flight**



Questions?

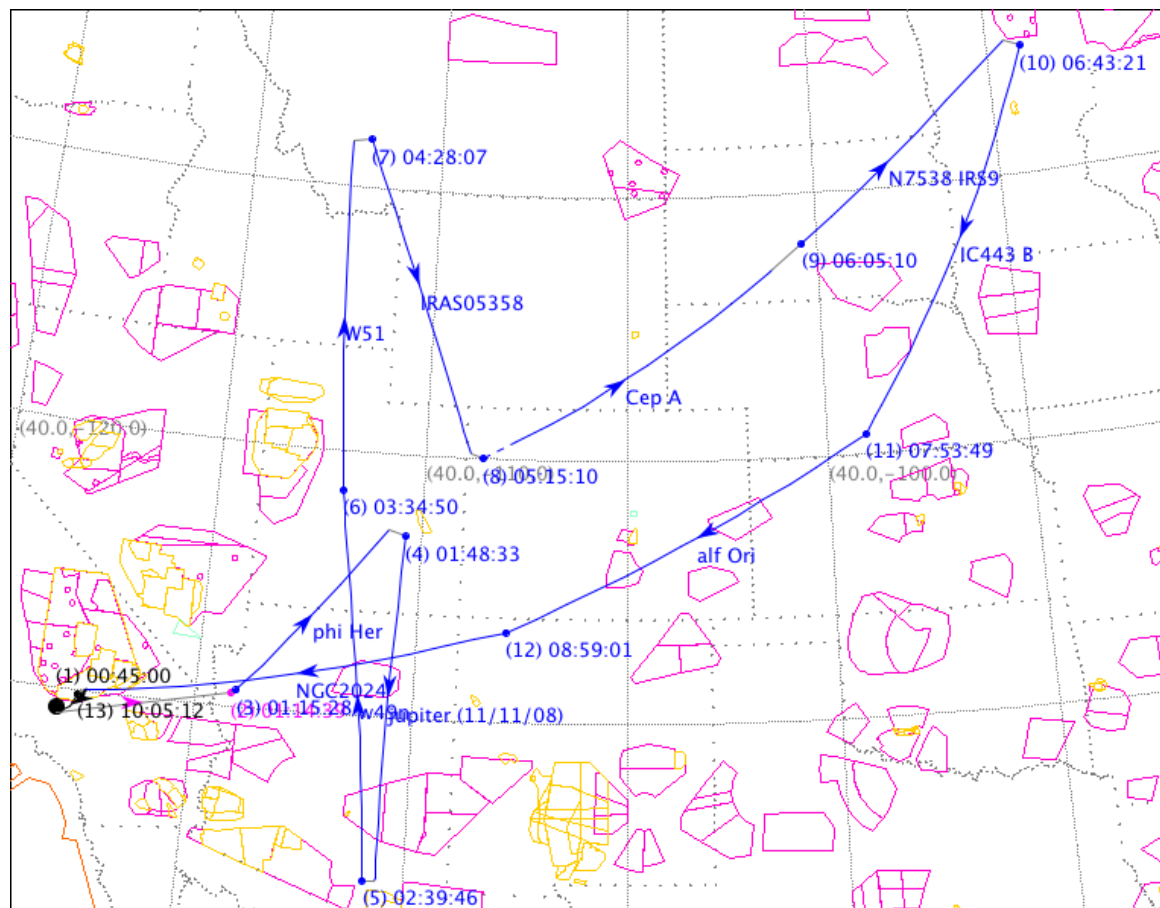
Flight Planning White Paper

Flight Planning White Paper

In response to the SUG's request, I have written a white paper on Flight Planning. The draft is complete and currently reviewed.

- Introduction
- Peculiarities of Flight Planning
 - Heading Balance and Restrictions
 - Absorption by Water Vapor and the Altitude Profile
 - Field Rotation and LOS Rewinds
 - Elevation and other Operational Constraints
- The Cycle Schedule
 - The Proposal Selection
 - Science Flight Series
- Detailed Flight Planning
 - A jigsaw puzzle with changing tiles
 - Timeline
- Concluding Remarks

Example flight plan



Flight Plan Name: File: BS2_A2_WX12.fp
 Flight ID: 2011/11/08
 Est. Takeoff Time: 2011-Nov-08 00:45 UTC
 Est. Landing Time: 2011-Nov-08 10:09 UTC
 Flight Duration: 09:24
 Weather Forecast : 1200 Mon Nov 07 2011 - 0000 Thu Nov 10 2011 UTC
 Saved: 2011-Nov-07 14:19 UTC User: rklein

- This flight plan was flown on the night Nov 7/8, 2011.
- The yellow areas are restricted airspaces and SOFIA cannot enter most of them
- The pink areas are other special use areas which SOFIA can overfly with the exception of the larger ones in Nevada.
- The orange line of the coast of California and Mexico shows part of the forbidden coastal warning areas

The Timeline

- **T-2 1/2 months (10 weeks):** Series planning starts. Flight dates and observation details are fixed.
- **T-10wk to T-8wk:** Flight planners lay out detailed flight plans for the series.
T-8wk to T-7wk: Series Plan gets iterated with the Director reviewing fair scheduling.
- **T-7 weeks:** The Observatory Director approves the “Initial Series Plan”. The Series Plan contains detailed flight plans for all flights in the Series.
- **T-7wk to T-5wk:** SciOps reviews the Series Plan.
T-5wk to T-4wk: Flight planners update the Series Plan with SciOps feedback.
- **T-4 weeks:** The “Post-Science Series Plan” is approved by SciOps. The Post-Science Series Plan has targets and calibrators for the series set and they cannot be changed after this time.
- **T-4wk to T-3wk:** MOPS reviews the Series Plan. MOPS together with SciOps start de-tailed preparations for the observing flights.
T-3wk to T-2wk: Flight planners update the Series Plan with MOPS feedback.

The Timeline

- **T-2 weeks:** The “Post-MOPS Series Plan” is approved by MOPS. The Post-MOPS Series Plan has the flight dates and any Canadian overflight cannot change after this time.
- T-2wk to T-1wk: Schedule reserve.
Form now on the flight plans get worked on separate.
- **t-7 days:** The “Initial Flight Plan” is released to the Flight Crew
- t-7d to t-3d: Flight crew reviews the science flight plan and iterates with flight planners.
- **t-36h:** The “36hWX Flight Plan” is released. The 36hWX Flight Plan has all flight legs defined, and sets crew report times. Only changes due to an updated weather forecast are allowed after this time.
- **t-12h:** The “12hWX Flight Plan” is released. It will be filed by the flight crew with air traffic control and then flown and the targets observed.