HIFI-ALMA Calibration discussion

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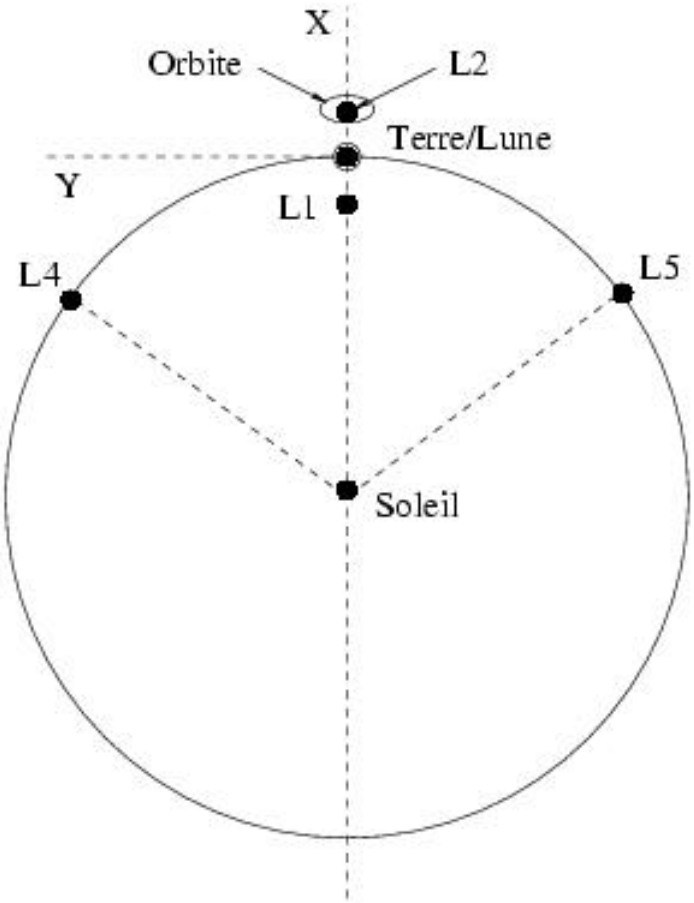
SRON

Overview

- HIFI on Herschel
- The HIFI Consortium
- HIFI as an instrument
- HIFI calibration group
- Frame work

HIFI on Herschel

- HIFI is the Heterodyne Instrument for the Far-Infrared
- Its frequencies are from 480-1250 GHz and from 1410-1910 GHz with 0.14-1 MHz resolution and 4 GHz bandwidth (2 Band 6)
- It will be located on Herschel in L2 at about 80K
- Herschel has a lifetime of over 3 years
- HIFI shares this time with PACS (camera/med. Res. Spectrometer) and SPIRE (camera/ med. Res. Spectrometer)

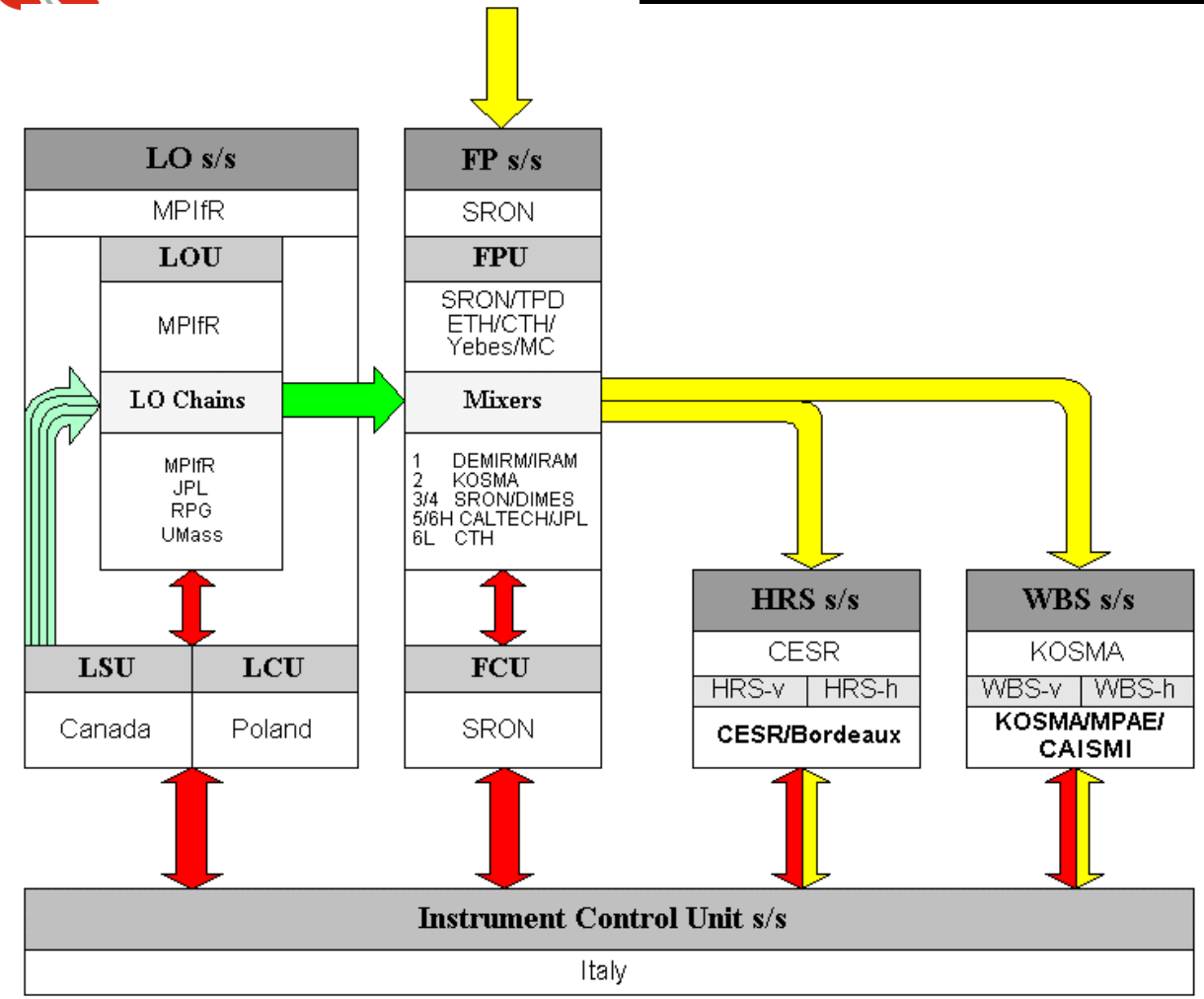


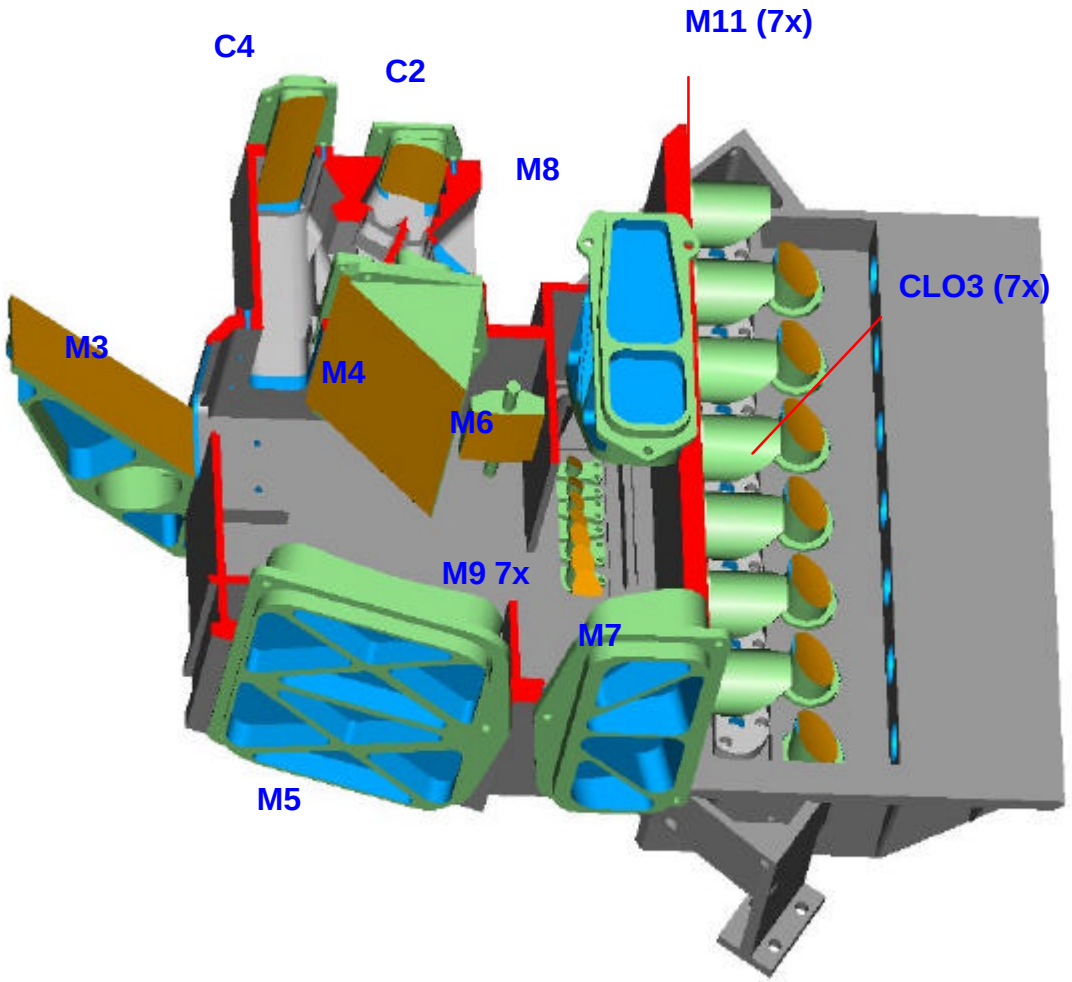
HIFI consortium

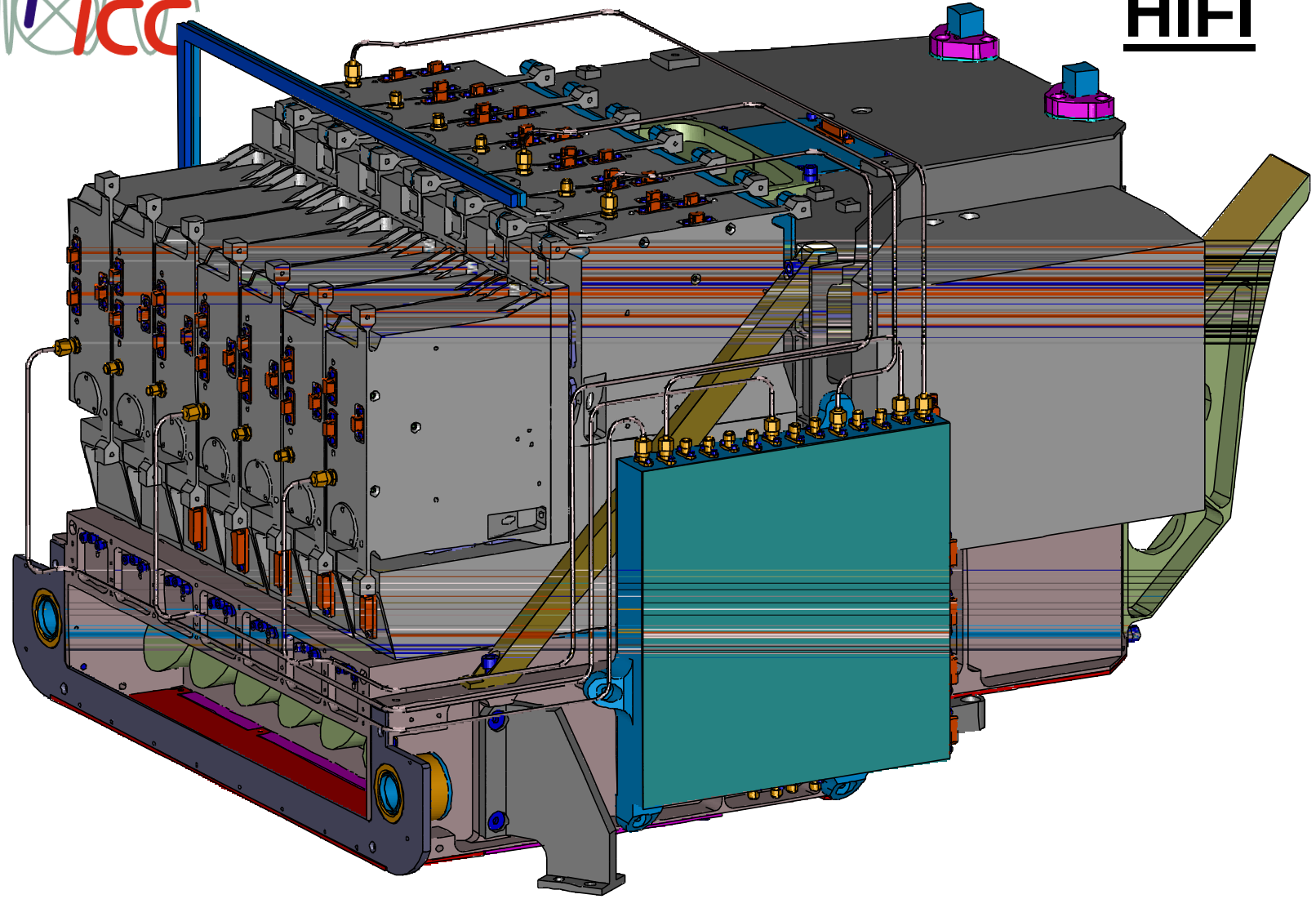
HIFI as an instrument

- Frequency coverage:
  - 480 – 1250 GHz (625-240 μm)
  - 1410 – 1910 GHz (212-157 μm)
- Near-quantum noise limit sensitivity (goal <3hν/k)
- SIS mixers upto 1250 GHz, HEB mixers from 1410-1910 GHz.
- Instantaneous IF bandwidth (in 2 polarisations): 4 GHz (Band 6: 2 GHz)
- Frequency Resolution 140 kHz – 280 kHz – 1 MHz
- Calibration Accuracy: 10% baseline; 3% goal

HIFI block diagram




C4
C2
M11 (7x)
M8
CLO3 (7x)
M3
M4
M6
M9 7x
M7
M5



Calibration

- Frequency calibration: From LO knowledge (HRS) and comb spectrum (WBS). Checks on rich line sources
- Beam calibration: (See Kramer) Note that we don't have any control on the (3.5 m) dish
- Band-pass calibration (See Ossenkopf)
- Intensity calibration: Tie into accepted temperature scales through planets and asteroids (See Teyssier/Gerin)
- Check the observing modes and calibrate individual scans
- Checks on stability, noise behaviour, dead times, accuracy, drifts etc.

Organisation

Satellite Calibration & Operations progress through dteailed documentation:

- Top level: Calibration Plan (+Technical Observing Modes) and Frame-work document
- Second level: End-User Requirements & Use Cases Document
- Use case analysis and observing modes document

- **Result:** Phase Verification Plan, Routine Operations Plan and long-term Operations Plan and calibrations within the Astronomical Observations Templates (AOTs).
- Implementation of use-cases will start next year. PV plan will be written in 2004, operations plans will come in 2005.