Ground/space calibration strategy:

from Planck/HFI to CoRE/PRISM

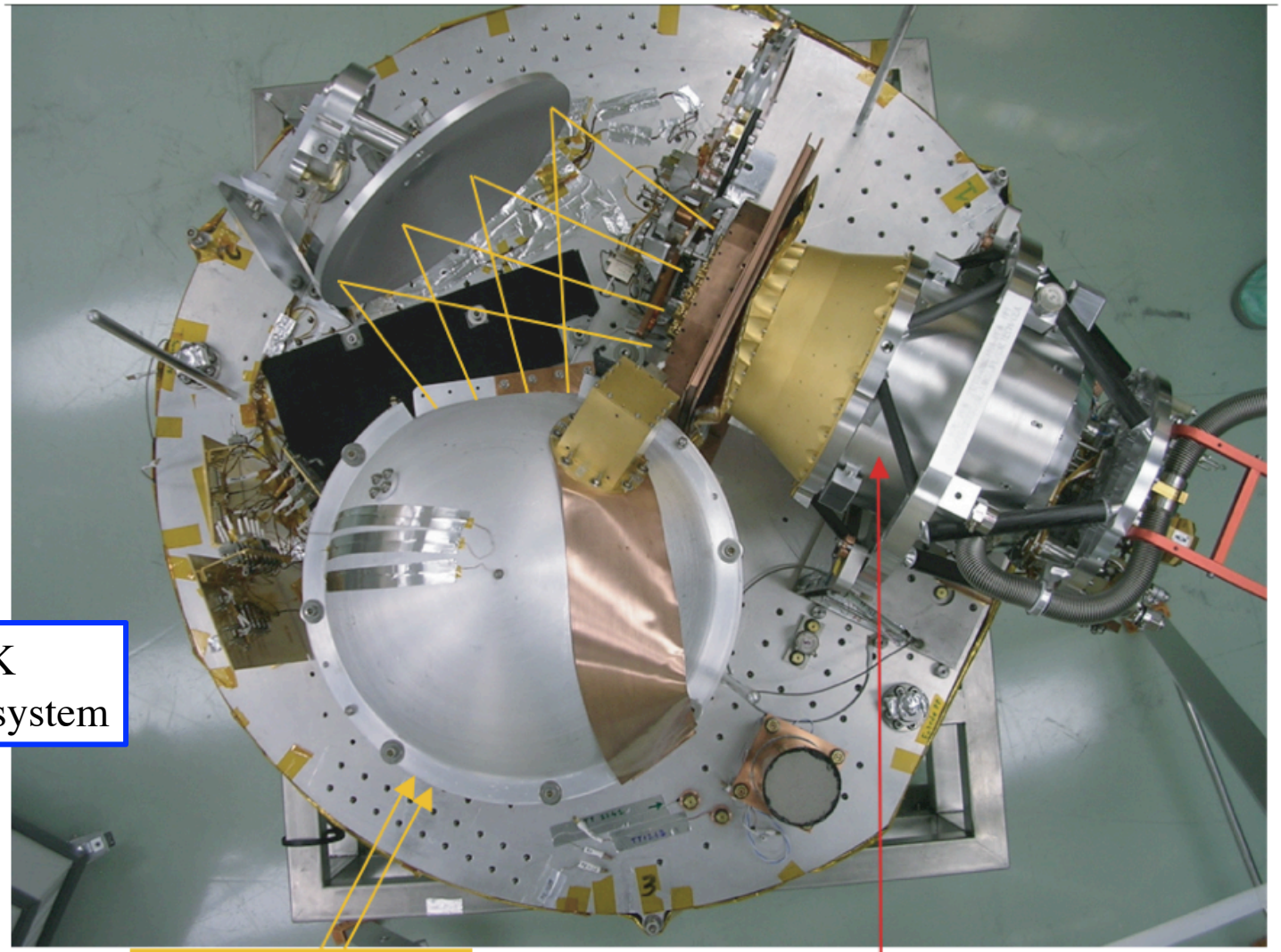
François Pajot

Planck/HFI ground calibration

- Strategy defined 11 years before launch

(IAS, 17/11/1998)	Ground			In-flight
	Component	Sub-system	HFI test and calibrat° facility	Planck payload
Beam on the sky		horn + telescope		√
Far side lobes		horn + telescope		√
Horn angular response	horns (cromaticity)	horn + filters + detector	pupil plane	
Spectral response (indiv., relative)	filters	" "	√	
Time response	detectors	" "	√	
Optical polarisation	polarizers	" "	?	
Responsivity (electrical, optical)	detectors	" "		
Linearity		" "		
Sensitivity to T_0 (100 mK stage) $T_{Background}$ (optical load) T_{4K} (4 K stage)	detectors "	" " " "	2nd priority 2nd priority 2nd priority	√
Absolute response		" "	1st order	√
Detectors noise	detectors	" "	√	√
Crosstalk (electrical and optical)		partly filled focal plane	electrical optical	
Readout electronics (capacitance stability, gains, noise)	readout electronics			
Compatibility : particles EMC LFI vibrations	detectors	 cryocoolers	self compatibility one LFI channel	

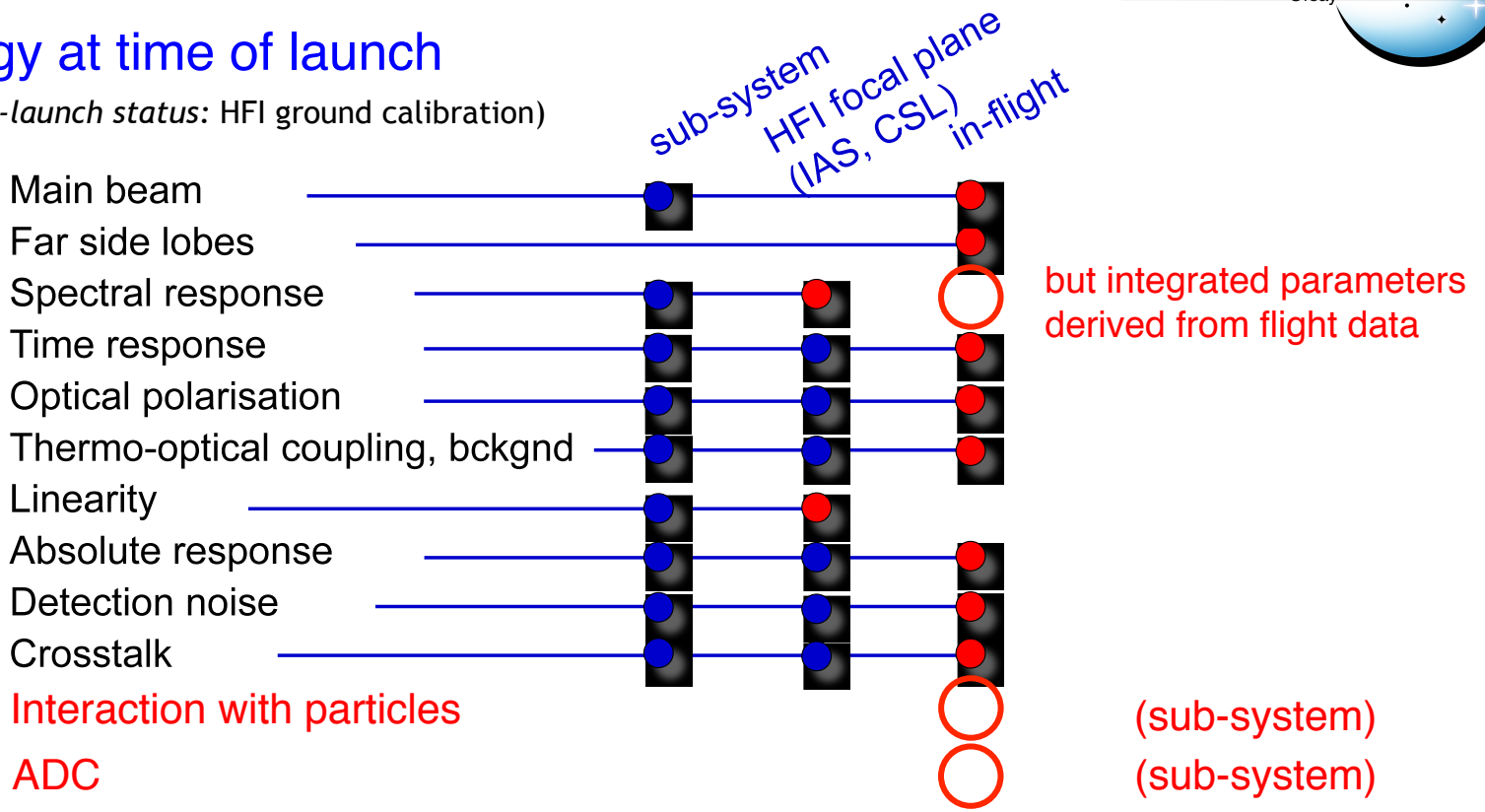
Planck/HFI ground calibration



Planck/HFI ground calibration

- Strategy at time of launch

(*Planck pre-launch status:* HFI ground calibration)



- In-flight determination for data processing
- Ground calibration is essential for
  - 1st order determination of instrument parameters
  - understanding the instrument and getting physical models of it
  - learning how to operate it and configure it for operations

CoRE/PRISM ground calibration strategy

- Similar sub-system – ground based – in-flight approach
- Polarization
- Spectral response
- Time response to lowest frequency (depends on scanning strategy)
- Do not forget particles interactions
  - representative subset of detection chain in front of accelerator
  - consolidate with modeling (GEANT 4)
- Do not forget ADCs
- Compatibility with cryochain
  - design
  - satellite level auto-compatibility tests

CoRE/PRISM ground calibration strategy

- Large focal plane means large optical setup
  - dealing with large number of pixels (statistics, pixel-per-pixel properties)
- Detectors (TES or KIDs ?) will require specific calibration scheme for the readout
  - stability of gain
  - time response
- Spectrometry capabilities would require dedicated sources
  - frequency absolute calibration on ground (lines in the ISM)
- Optical coupling with telescope
  - what can be done on the ground but modeling ?
- Systematics of unknown origin at the level of sensitivity required ?

THE END