

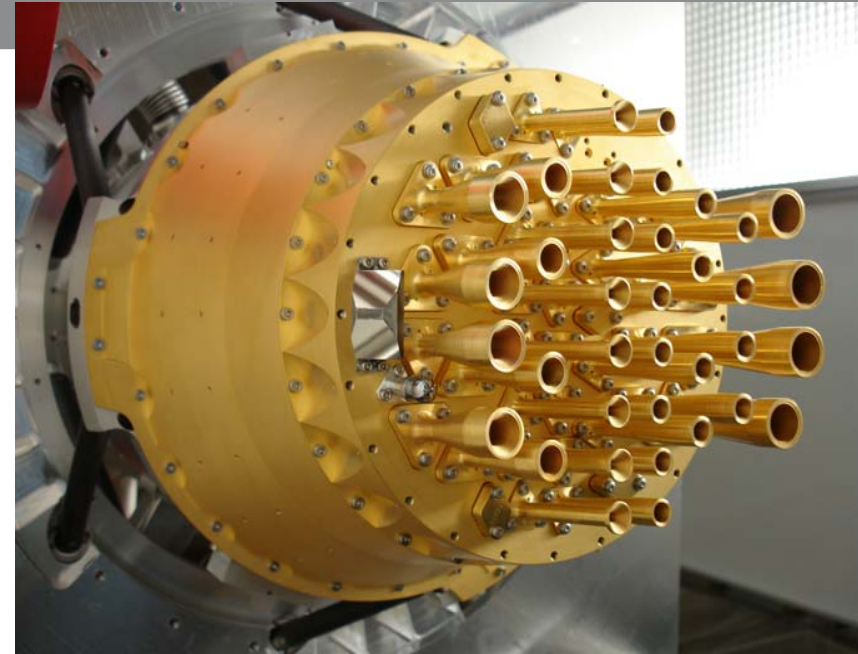
Planck

High frequency Instrument

Jean-Loup PUGET
Institut d'Astrophysique Spatiale, Orsay

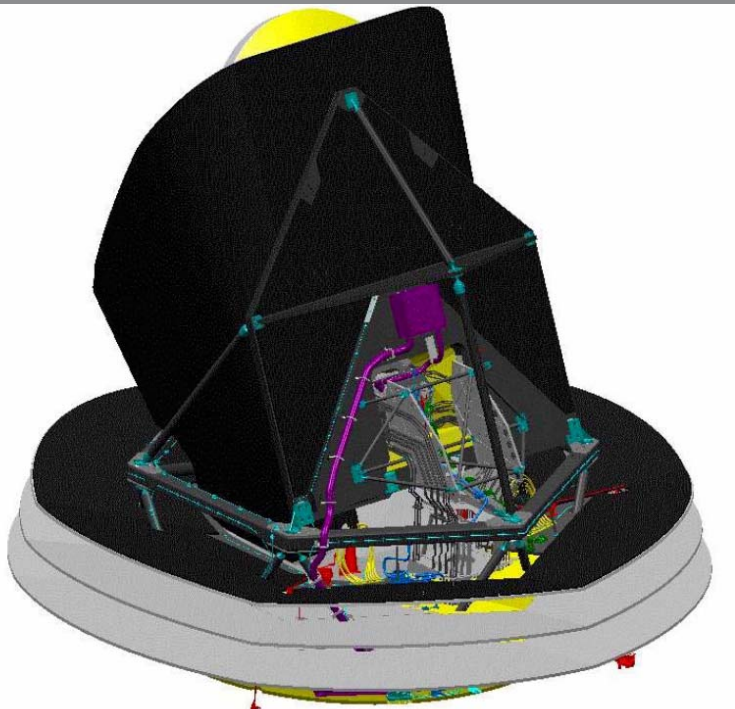
HFI: very low temperature in space

- HFI will cover for the first time the whole sky in 6 spectral bands (100 GHz to 850 GHz) with a resolution of a few arc minutes
- The detectors are cooled to 0.1 degree above absolute zero with a stability of a fraction of a millionth of a degree
- this leads to an unprecedented sensitivity detecting fluctuations ten million times smaller than the average intensity
- these maps will be used for many astrophysical and cosmological studies



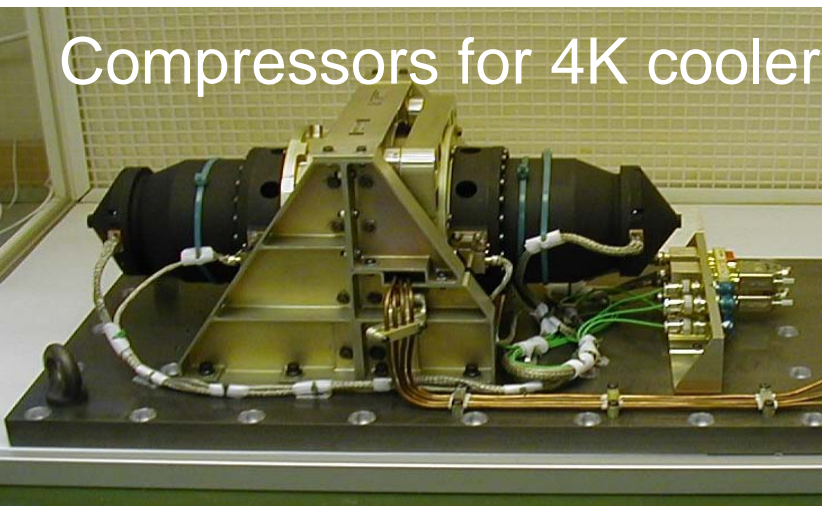
- The primary goal is the mapping of the granularity of the Cosmic Microwave Background
- The gain in sensitivity with respect to the NASA WMAP mission is a factor of 10

4 refrigerators in Space Coldest detectors on a satellite



Passive radiators

Compressors for 4K cooler



Dilution cooler 0.1K



- 1. For the polarization of this radiation (the direction in which the microwave radiation vibrates) the sensitivity is crucial**
- 2. Testing the existence of an inflation phase in the very early stages of the big bang in which all structures we see today (stars, galaxies, clusters of galaxies) started is one of the objectives of the HFI**
- 1. Gravitational waves are predicted to be generated during inflation. These have a very special signature in the polarization of the Cosmic Microwave Background.**
- 1. New physics is expected in the very early universe. Planck will test this in a complementary way to the largest particle accelerators like the LHC because during inflation, particles have each an energy billions times larger than the ones produced in the LHC**

Planck HFI a multidisciplinary experiment



- Planck HFI will be one of the most powerful tools of cosmologists in the coming decade
- Planck HFI will provide a general astrophysics all sky survey for interstellar dust emission, star formation physics, evolution of infrared galaxies.
- cosmologists, astrophysicists, particle physicists are involved in Planck HFI

THANK YOU

Jean-Loup Puget

Institut d'Astrophysique Spatiale, Orsay, France

jean-loup.puget@ias.u-psud.fr