

SUBJECT: FIRST/Planck - FIRST Telescope Meeting
 File: ESA/M/0050.10

O/L

PLACE: ESTEC

| Participants | Organ. | Distribution |
|--------------|---------------------------------|--------------|
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| AGREEMENTS STATEMENTS | ACTION |
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| <p>1, <u>Introduction</u></p> <p>ESTEC informed on Conceptual Design Review that was held at JPL 7/8. September 98.</p> <p>The Instrument asks whether the Review data package could be provided to the Instruments.</p> <p>ESTEC will check with JPL.</p> <p>2, <u>Refocusing Mechanism</u></p> <p>The possibility of the FIRST instruments to measure the focus position has been discussed.</p> <p>All three instruments will perform a quantitative analysis of the instrument capabilities with the following assumption</p> <ul style="list-style-type: none"> - Nominal telescope (3.5m) - WFE telescope 6µm rms, correctly focussed distributed to spherical aberration - Nominal pointing accuracy jitter 0.3 arcsec, 1min 9σ <p>All instruments will evaluate the amount of work to be done and provide due dates</p> | |

| AGREEMENTS STATEMENTS | ACTION |
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| <p>for the analysis by 16.10.98</p> | <p>RI-1 PACS RI-2 HIFI RI-3 SPIRE 16.10.98</p> |
| <p>3) <u>Specification of a 3.8 Telescope</u></p> <p>- The modifications for the change of the telescope specification were discussed and a baseline for 3.8 m proposed. This definition will be forwarded by ESA to JPL. (see attachment)</p> <p>- Major concerns are raised from the SPIRE instrument team: on lack of telescope opto/mechanical design. This opto/mechanical design is necessary for further detailed instrument design that is about to start now!</p> <p>- It is realized that the change of telescope size will affect the instrument designs for all three instruments. Therefore this final choice needs to be made well in advance to the C&M delivery, i.e. end 1999/early 2000. The amount of changes to the FPU will be evaluated by the Teams by early 1999.</p> | <p>RI-4 PACS RI-5 HIFI RI-6 SPIRE 1. Feb. 99</p> |

| AGREEMENTS STATEMENTS | ACTION |
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| <p>4.) <u>Instrument Straylight Model</u></p> <p>A Spire Straylight model will be distributed early October.</p> <p>This can be used to establish the PLM/FPV Straylight Model that has to be delivered to JPL.</p> <p>A PACS model is not yet existing. This will be established early 1999 and then included the PLM/FPV Straylight Model.</p> <p>It is believed that for the purpose of the straylight model no HFI model is needed.</p> <p>5) <u>AOB</u></p> <p>- There is a discussion from HFI on potential interface problem at the H3 mirror.</p> <p>This triggered some discussions whether optimisation of the sharing of the Optical bench among the instruments could be done.</p> <p>ESA stated that this is possible and instrument teams should</p> | |

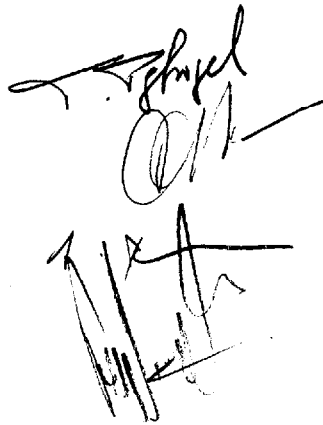
AGREEMENTS STATEMENTS

ACTION

provide resp. proposals.
These proposals will be provided
to ESA to iteration with the
teams before discussion with industry.
ESA will provide to the instruments
the geometry of the instrument
shield.

AI-7 PACS
AI-8 HIFI
AI-9 SPIRE
30.10.98

AI - ESA
9.10.98



Handwritten signatures and initials, including a large signature that appears to be 'G. R. ...' and another signature below it.

4.2 Optical Requirements

4.2.1 Telescope Performances

The telescope shall comply with the following optical performance requirements till the end of its life:

| | | |
|----------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TEPE-045 | Operating wavelength range | 85 ⁸⁰ μm to 600 ⁶⁷⁰ μm . |
| TEPE-050 | Telescope total WFE Budget | $\leq 10 \mu\text{m rms}$ $\leq 6.0 \mu\text{m rms (goal)}$ These performances shall be met within the performance temperature range for the complete FOV. |
| TEPE-055 | Relative spectral transmission ^a | $\geq 0.97 \text{ BOL}^b$ $\geq 0.98 \text{ BOL (goal)}^b$ $\geq 0.95 \text{ EOL (goal)}^c$ This shall be demonstrated - at any wavelength λ within the operating range measured on witness samples over a sampling interval of $\Delta\lambda/\lambda = 1/100$ - and by analysis over the entire FOV. |
| TEPE-060 | Non-uniformity of relative spectral transmission ^d | $\leq \pm 0.01$. |
| TEPE-065 | The aperture stop location shall be implemented at the secondary reflector. | |
| TEPE-070 | The system focal length shall be | $28.5 \text{ m} \pm 0.05 \text{ m}$ (3.5 m) |
| | and the f-number of the telescope shall be $f/D = 8.68$, where D is the diameter of the effective aperture. | (3.8) 30.9 m |
| TEPE-075 | The Field-of-view (FOV) shall be | $\pm 0.25^\circ$, free of vignetting (3.5 m) (3.8 m) |
| TEPE-080 | The telescope shall maintain the specified performance over its lifetime without the need for a refocussing mechanism. | |
| TEPE-085 | The telescope design shall be such as to avoid narcissus effect. | |

4.2.2 Straylight

The Straylight requirement for the telescope including the sunshield, is defined w.r.t. the straylight level obtained at a specified detector element location. The definition of the optical components and properties between the Primary reflector and the detector element, as far as relevant for the straylight verification is called the **PLM/Focal Plane Unit Straylight model** and will be provided by ESA.

4. MISSION AND PERFORMANCE REQUIREMENTS of the TELESCOPE

4.1 General Specifications for the Telescope

4.1.1 Telescope

The general configuration of the telescope is shown in Figure 4.1-1.

The telescope shall comply with the following specifications:

- TEPE-005 The average telescope temperature shall be within a temperature range of 70 K to 90 K (TBC).
This is called the **Performance Temperature Range**.
- TEPE-010 The telescope shall be designed to meet its performance within the Performance Temperature Range.
- TEPE-015 The optical free diameter of the Primary Reflector shall be ³⁸⁰⁰ ~~3800~~ mm +2mm, - 0 mm.
- TEPE-020 The f-number of the Primary Reflector shall be 0.5 ^{for 3.80 m}
radius of curvature fixed for 3.5m to 3.8m
- TEPE-025 The area obscuration ratio including:
- tripod with secondary reflector and its shadowing
- "cone in secondary"
shall be: ≤ 0.03 (with respect to the paraxial entrance pupil).
- TEPE-030 The distance of the primary reflector vertex-best on axis focus shall be
- by construction value $t_0 = 975 \text{ mm} \pm 10 \text{ mm}$
- this value shall be measured with the accuracy defined in 4.3.3.
- TEPE-035 The distance of the telescope fixation plane to the primary reflector vertex t_1 shall be less than 125 mm (see Figure 4.1-1).

4.1.2 Heaters

The telescope will be designed to allow the decontamination of the optical surfaces in the early orbital phase by means of heaters.

- TEPE-040 The heaters shall allow an increase of the orbital average temperature of the telescope to the contamination release and bake-out temperatures, defined as maximal temperatures in para 5.5 for a minimum duration of 3 weeks (tbc).