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Datum/Date: 25/03/03

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Betreff/Subj.: Instruments Thermal Link Interface Meeting (PACS and SPIRE)

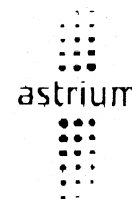
Dear Sirs,

We would like to invite you to the Instrument Thermal Link Interface Meeting on 3 – 4 April 2003 at Astrium, Friedrichshafen.

The meeting will start on 3rd April 2003 at 14h00 in Meeting Room Mersburg, Building BG8, 5th Level.

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The following draft Agenda is proposed:

1. Introduction (ASED)
2. Instrument Presentation of thermal IF requirements, covering nominal in-orbit operations and cooler recycling (PACS and SPIRE)
3. Current design of L0, L1 and L3 thermal links (ASED)
4. H-EPLM Thermal Model status (ASED)
5. Discussion of proposed requirements for each thermal link
6. Establishment of the thermal interfaces requirements
7. On-ground thermal interface for EQM and PFM testing
8. AOB

Please find attached the PACS (Annex 1), the SPIRE (Annex 2) and HIFI (Annex 3) interface temperatures and heat flows, as currently applicable and specified by the instrument teams in SPIRE and PACS relevant ECRs together with TMM analysis results. Furthermore, the thermal link interface requirements, as applicable to the OBA subcontractor Sener/Air Liquide, are provided.

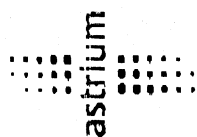
Please confirm your attendance asap. If you need support for your accommodation arrangements, please contact the project secretariat, Ms. Karin Pietroboni, Tel. +49 7545 8 4240, Fax +49 7545 8 4243.

Kind regards

Astrium GmbH

i. V. W. Rühle

i. A. R. Hohn



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Annex 1: PACS L0 and L1 Interface Temperatures and Heat Loads

| Instrument I/F | Applicable and Derived Requirements (IID-B, lss 2.1) | | | | | | Non-agreed Requirements (ECR 009) | | | | | | OBA Spec | |
|------------------------------|--|--------------|-----------|---------------------------|-----------|---------------|-----------------------------------|-----------|-------|---------------------------|-----------|------|-----------|-------|
| | In-Orbit Operation | | | In-Orbit Cooler Recycling | | | In-Orbit Operation | | | In-Orbit Cooler Recycling | | | Heat load | W/K |
| | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | Heat load | W/K |
| PACS Blue Detector [723] | L0 | 1.6 - 2.0 K | 1.5 mW * | 0.005 | N/A | N/A | N/A | 0.8 mW ** | 0.003 | N/A | N/A | N/A | 2 mW | 0.018 |
| PACS Red Detector [721] | L0 | 1.6 - 1.75 K | 0.7 mW * | 0.014 | N/A | N/A | N/A | 0.7 mW ** | 0.014 | N/A | N/A | N/A | 2 mW | 0.06 |
| PACS Cooler Pump [761] | L0 | 1.6 - 2.2 K | 3.9 mW * | 0.008 | ≤ 10 K | 450 mW peak | 2.0 mW ** | 2.0 mW ** | 0.004 | ≤ 10 K | 250 mW** | 1 mW | 0.05 # | |
| PACS Cooler Evaporator [762] | L0 | 1.6 - 2.0 K | 3.9 mW * | 0.013 | < 2K | not specified | 3.7 mW ** | 3.7 mW ** | 0.025 | 1.6 - 1.85 K | 53 mW** | 8 mW | 0.1 # | |
| PACS Photom. [781] | L1 | 3 - 5 K | 12.1 mW * | | 3 - 5 K | N/A | 7.9 mW ** | 7.9 mW ** | | 3 - 5 K | N/A | 8 mW | 0.025 | |
| PACS Collimator [782] | L1 | 3 - 5 K | 7.2 mW * | | 3 - 5 K | N/A | 6.7 mW ** | 6.7 mW ** | | 3 - 5 K | N/A | 5 mW | 0.025 | |
| PACS Spectro-meter [783] | L1 | 3 - 5 K | 4.1 mW * | | 3 - 5 K | N/A | 5.2 mW ** | 5.2 mW ** | | 3 - 5 K | N/A | 5 mW | 0.025 | |

*) Interface heat flow as calculated with implemented Issue 1 instrument TMM's, see HP-2-ASED-RP-0011, Issue 2.1

**) Interface heat flow as calculated with implemented new PACS TMM and clarified with R. Katterloher on 11.03.03.

#) recommended in IID-B

H.T.T at 1.7 K

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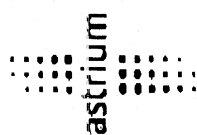
Annex 2: SPIRE L0 and L1 Interface Temperatures and Heat Loads

| Instrument I/F | Applicable and Derived Requirements (IID-B, Issue 2.0) | | | | | | Non-agreed Requirements (ECR 009) | | | | | | OBA Spec. | |
|-----------------------------------|--|-----------|-----------|--------------------|---------------|---------------|-----------------------------------|------------------------------|------|---------------------------|---------------|--------|-----------|-------|
| | In-Orbit Operation | | | In-Orbit Operation | | | In-Orbit Operation | | | In-Orbit Cooler Recycling | | | In Orbit | |
| | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | W/K | Heat load | W/K |
| SPIRE SM Detector enclosure [814] | L0 | ≤2.0 K | 3 mW | 0.01 | N/A | N/A | ≤1.8 K | 5 mW (2.8 mW ^{**}) | 0.05 | N/A | N/A | N/A | 2.5 mW | 0.075 |
| SPIRE Cooler Pump HS [815] | L0 | ≤2.0 K | 1.8 mW | 0.006 | ≤10 K | 450 mW peak | ≤1.8 K | 2 mW (2.2 mW ^{**}) | 0.02 | ≤10 K | 450 mW peak | 2.5 mW | 0.05 # | |
| SPIRE Cooler Evaporator [816] | L0 | ≤2.0 K | 0.6 mW | 0.002 | ≤2.0 K | not specified | ≤1.8 K | 1 mW (0.4 mW ^{**}) | 0.01 | ≤2.0 K | not specified | 1.0 mW | 0.1 # | |
| SPIRE L1 (two straps) [800] | L1 | ≤6.0 K | 18.2 mW * | | not specified | not specified | ≤4.5 K | 13 mW (19 mW ^{**}) | | | not specified | 19 mW | 0.07 | |

*) Interface heat flow as calculated with implemented Issue 1 instrument TMM's, see HP-2-ASED-RP-0011, Issue 2.1
 #) recommended in the IID-B

**) calculated with implemented new PACS and new SPIRE ITMM

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Annex 3: HIFI L0 and L1 Interface Temperatures and Heat Loads

| Instrument I/F | In-Orbit Operation | | | In-Orbit Cooler Recycling | | OBA Spec. | |
|----------------|--------------------|-------------------------|------------------|---------------------------|-----------|-----------|-------|
| | I/F Temp. | Heat load | W/K | I/F Temp. | Heat load | Heat load | W/K |
| HIFI L0 | ≤2.0 K | 8.6 mW * (7.1 mW) ** | 0.029 (0.024) | N/A | N/A | 9 mW | 0.045 |
| HIFI L1 | ≤6.0 K | | | N/A | N/A | 12 mW | 0.03 |

*) Interface heat flow as calculated with implemented Issue 1 instrument TMM's, see HP-2-ASED-RP-0011, Issue 2.1

**) Interface heat flow with implemented Level 3 in H-EPLM TMM.

HTT at 1.7 K