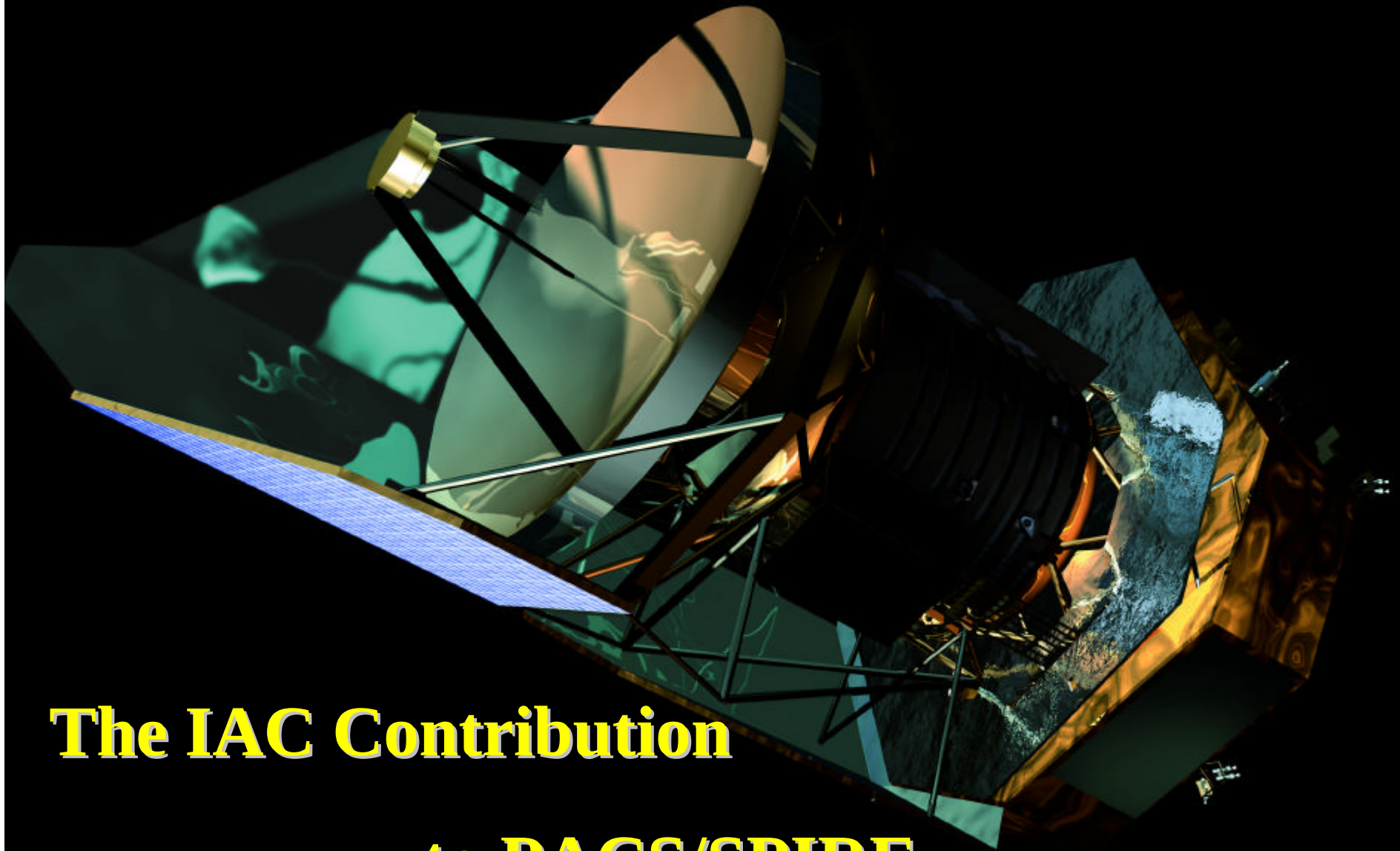


HERSCHEL

**The IAC Contribution
to PACS/SPIRE**





IAC Contribution to HERSCHEL/PLANCK



- Funds from Plan Nacional del Espacio
- HERSCHEL
 - PACS
 - SPU
 - Low level SW
 - ICC
 - SPIRE
 - ICC
- PLANCK
 - LFI
 - REBA (DPU & SPU)
 - DPC



The IAC PACS rogues



Engineering:

J.M. Herreros (PM)

M. Amate

O. Batet

H. CHulani

A. Díaz

T. Filipova

M.F. Gómez Reñasco

A. Obrado

M. Sánchez

Science:

J. Cepa (PI)

J. Acosta Pulido

H. Castañeda

S. Iglesias-Groth

A. Pérez-García

J.M. Rodríguez-Espinosa

M. Sánchez-Portal (ESAC)



IAC MAIN CONTRIBUTION TO PACS



- Local management and instrument system engineering
- SPU electronics equipment: Signal Processing Units (SPU SWL and LWL), Power Supply Unit (PSU), and data acquisition unit (DAU)
- On-board software: SPU start-up software and low-level software drivers
- Ground science data processing for the PACS instrument Control Center (ICC)
- Science preparation
- Participation in PEP Extragalactic survey



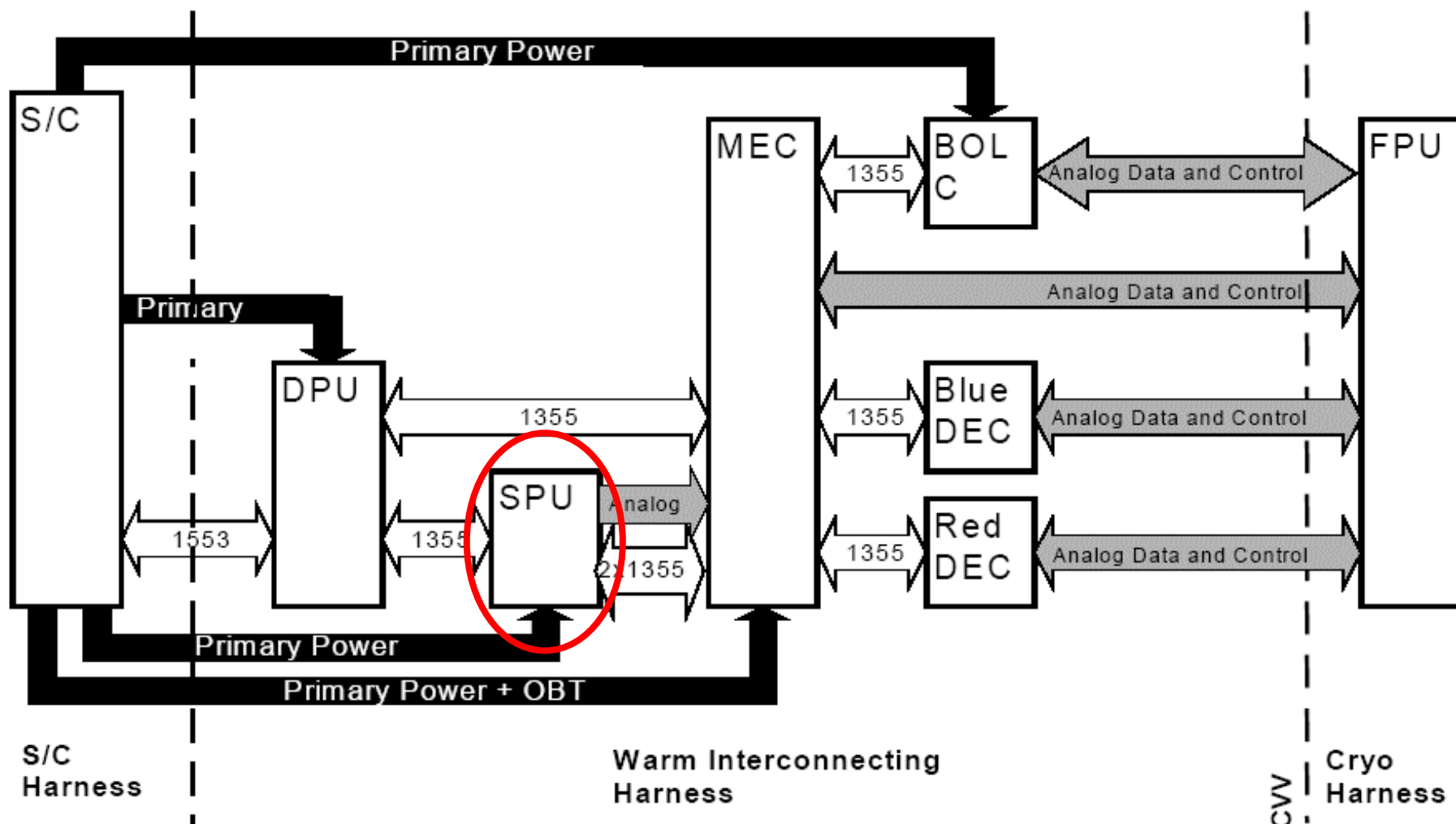
The PACS SPU



- Autonomous SC operation during 21 hours per day
- 3 hours downlink per day to transmit science data + HK
- Limited telemetry rate of ~118 kbps
- Maximum raw data stream of ~4000 kbps
- Then raw data should be compressed by a factor ~34
- On-board processing prior to lossless compression required
- These are the functions of the SPU HW and SW (U.Wien)



IAC MAIN CONTRIBUTION TO PACS





The SPU



- **The SPU comprises four functional sub-units:**
 - The Short Wavelength Signal Processing Sub-unit (SPU-SWL).
 - The Long Wavelength Signal Processing Sub-unit (SPU-LWL).
 - The Power Supply Unit (PSU).
 - The Data Acquisition Unit (DAU).

The SPU-SWL and SPU-LWL perform the same functions but process data coming from different detectors, short and long wavelengths respectively. They serve as mutual backups as well.



The PSU & DAU



- **The PSU main functions are:**
 - Conditioning of the S/C primary power providing of galvanic isolation to the SPU.
 - Conversion of the S/C bus voltage into a number of regulated output voltages, which will be current limited, short circuit and over-voltage protected.
 - Control of DC/DC converter switching.
 - Distribution of the electrical power to the SPU sub-units (SWL-SPU and LWL-SPU)
- **The DAU is in charge of the internal HK acquisition and analogue interface to DECMEC.**



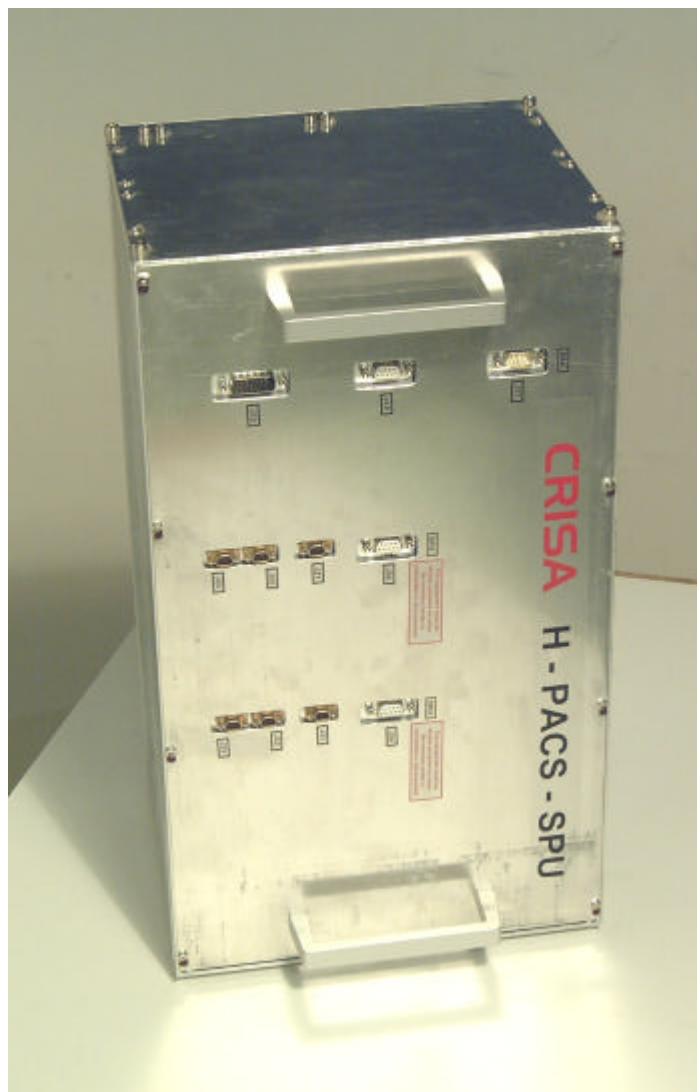
The PSU & DAU



- **The SPU low level software includes the Start-up Software (SUSW) and the Low-Level software drivers (LLSW_DRV).**
 - The SUSW is executed upon reset (HW or SW reset).
 - The SUSW is in charge of performing the following tasks:
 - Power up initialization.
 - Reset source discrimination
 - Hardware self-tests
 - Implementation of the command reception/execution loop, receiving commands (TC) and sending responses (TM) through the 1355/Spacewire communication link interface.
 - Transfer control to APSW, upon reception of appropriate command.

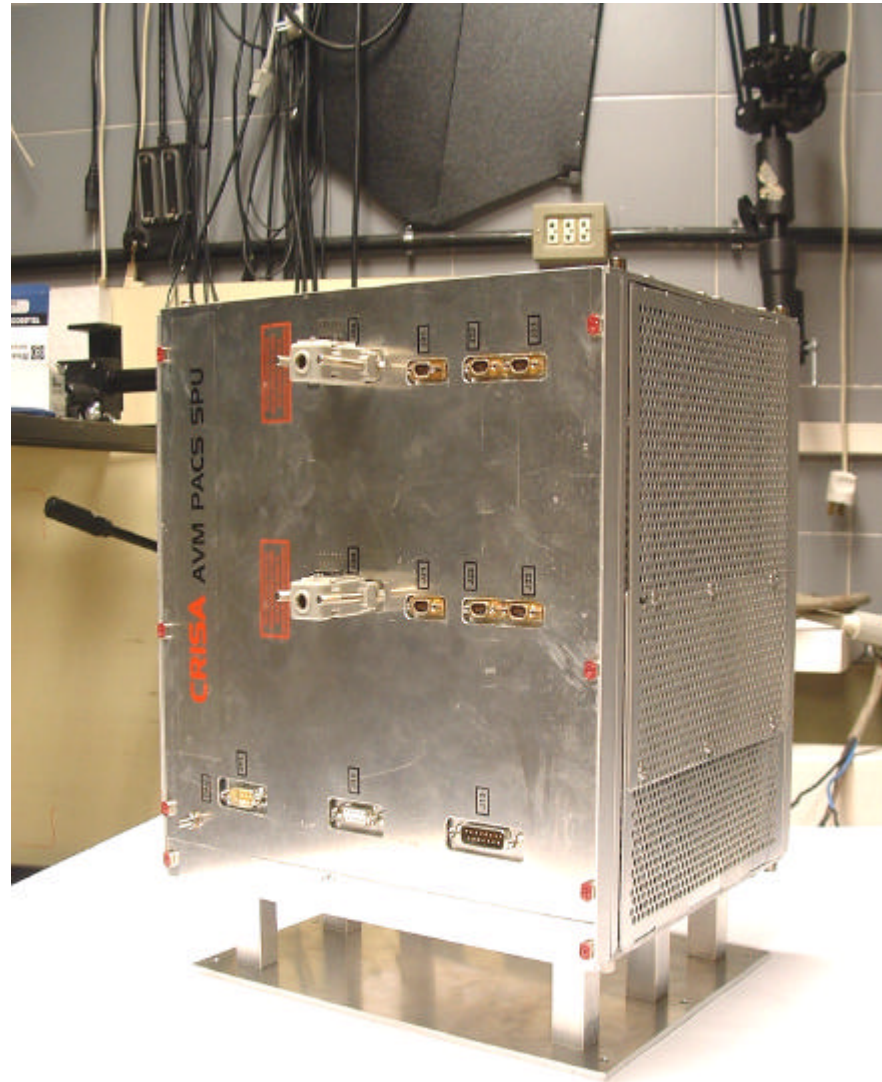


SPU EM MODEL





SPU AVM MODEL





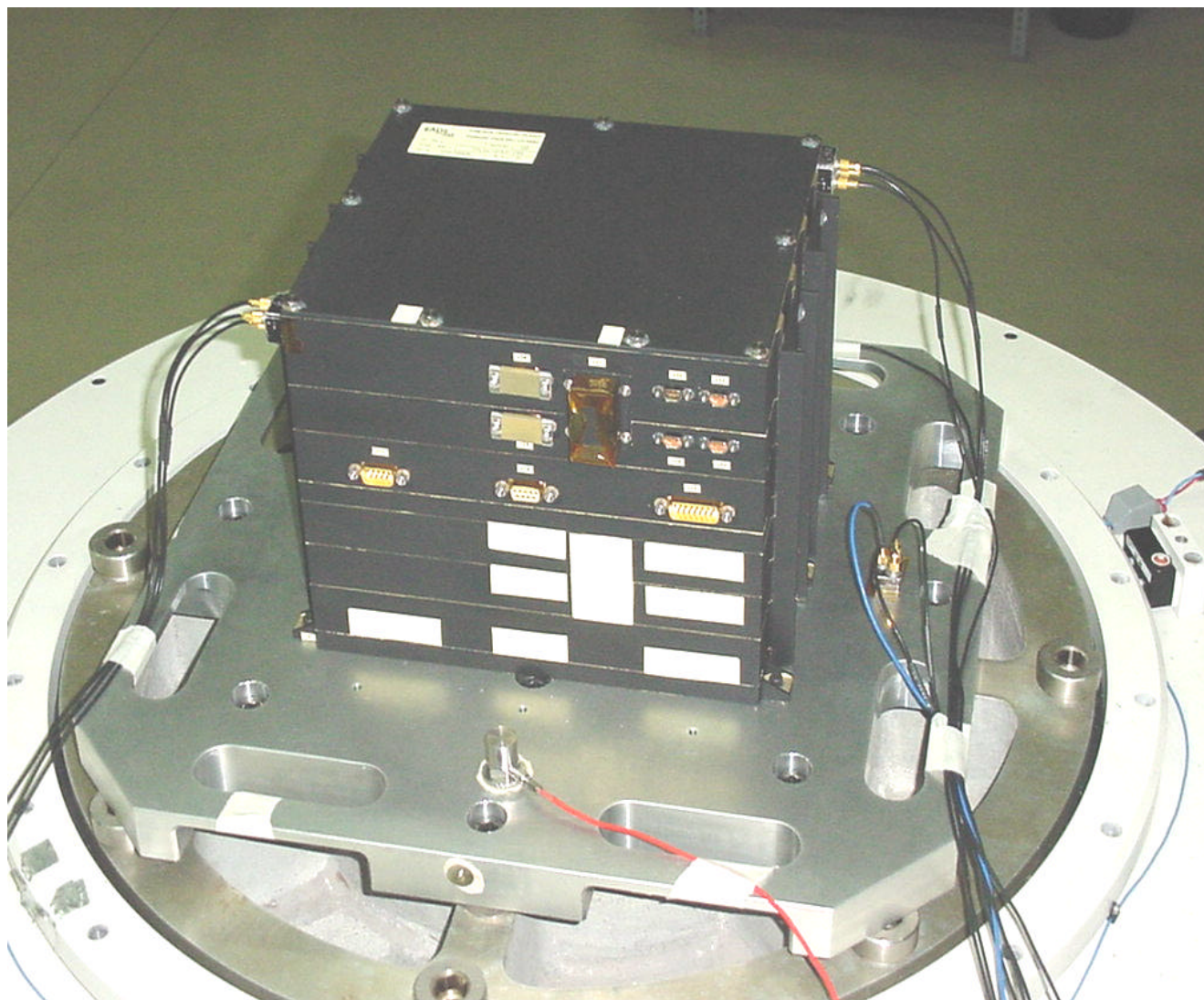
SPU QM MODEL



**Mechanical
assembly
manufactured
at iac
workshop**



SPU QM MODEL



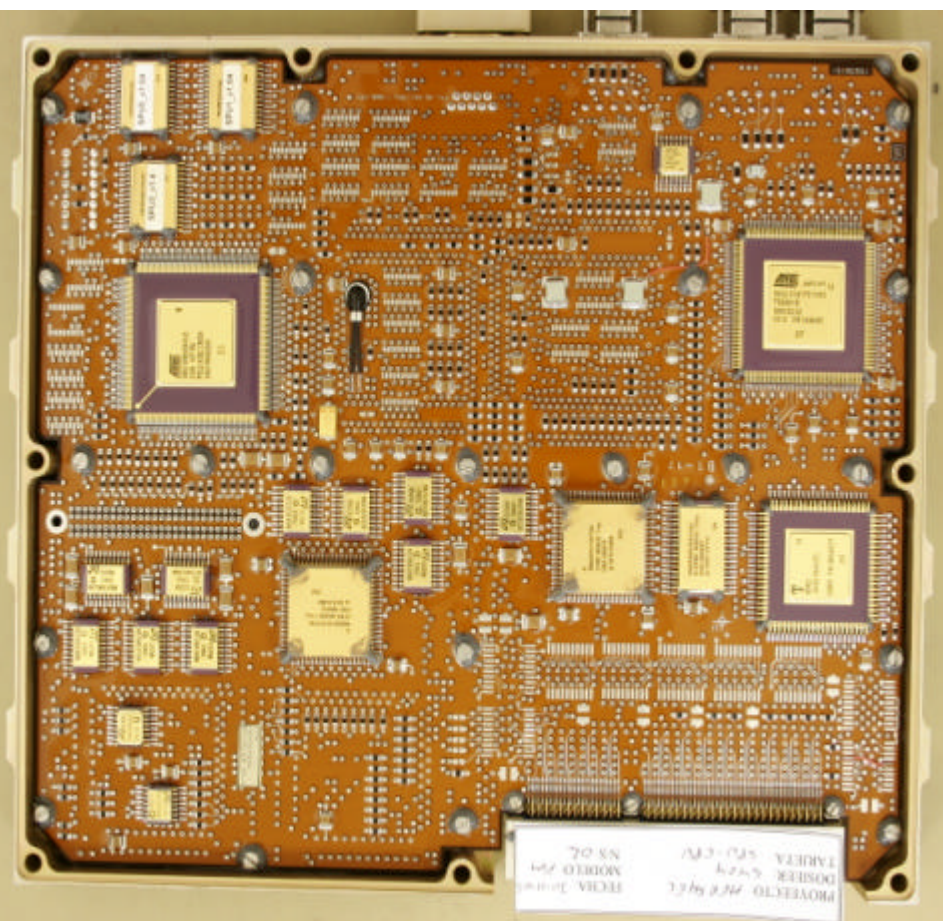
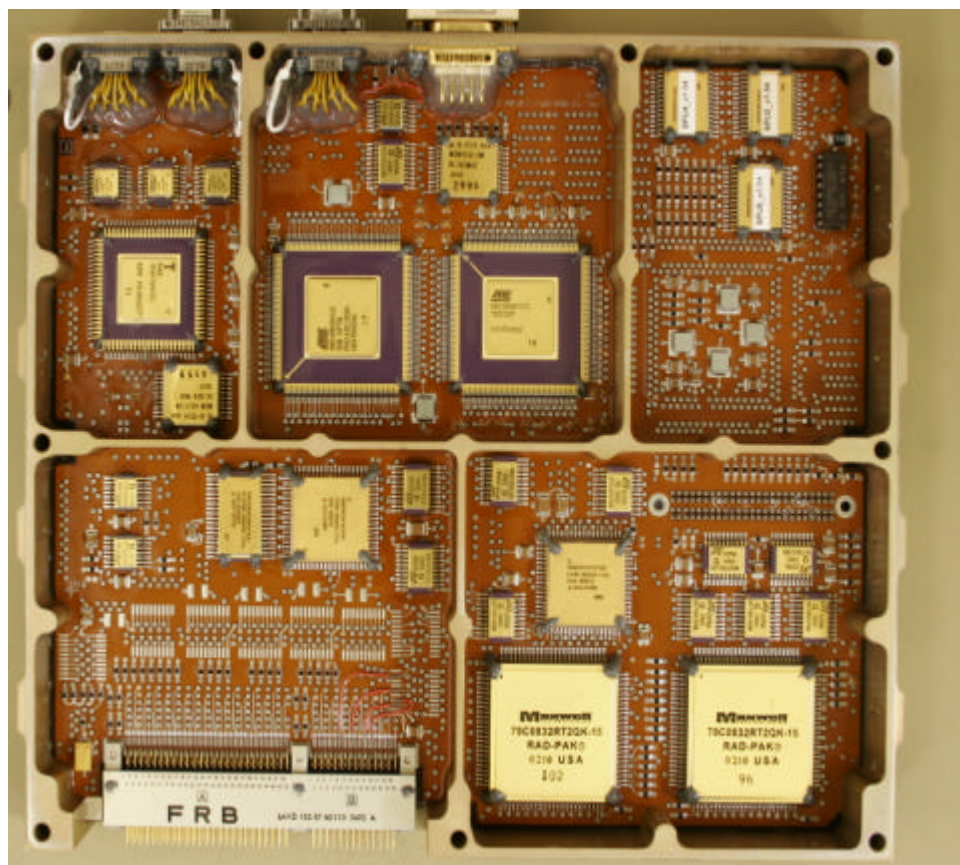


SPU FM MODEL



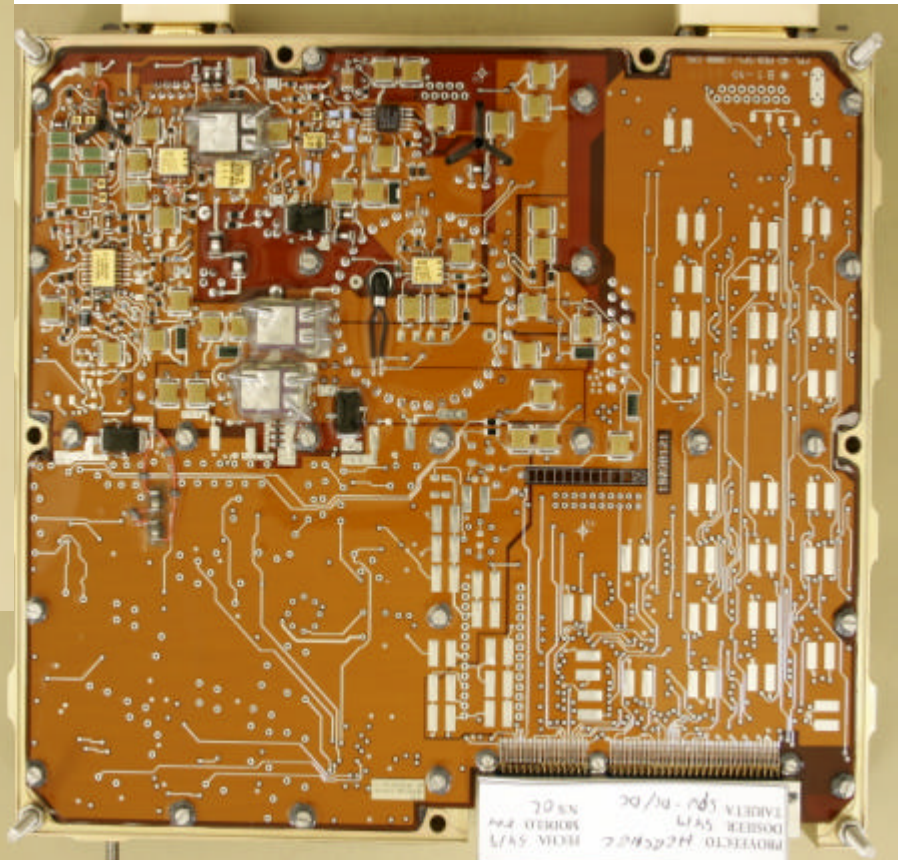
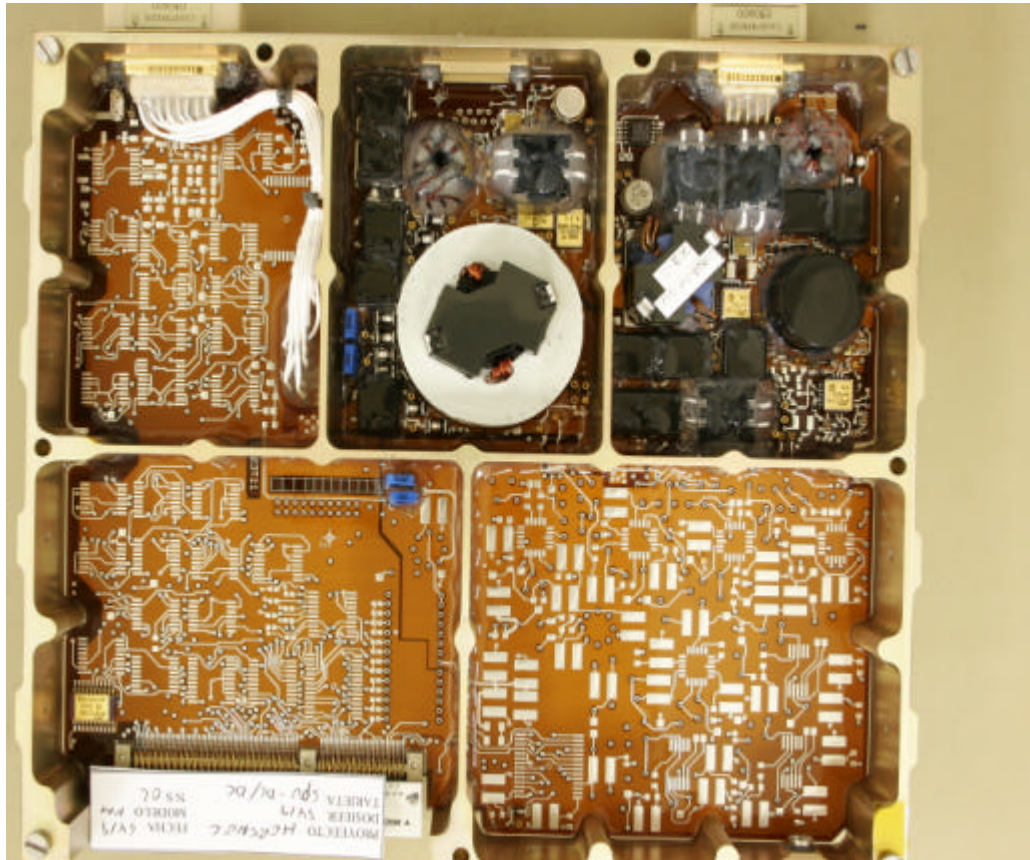


SPU CPU FM MODEL



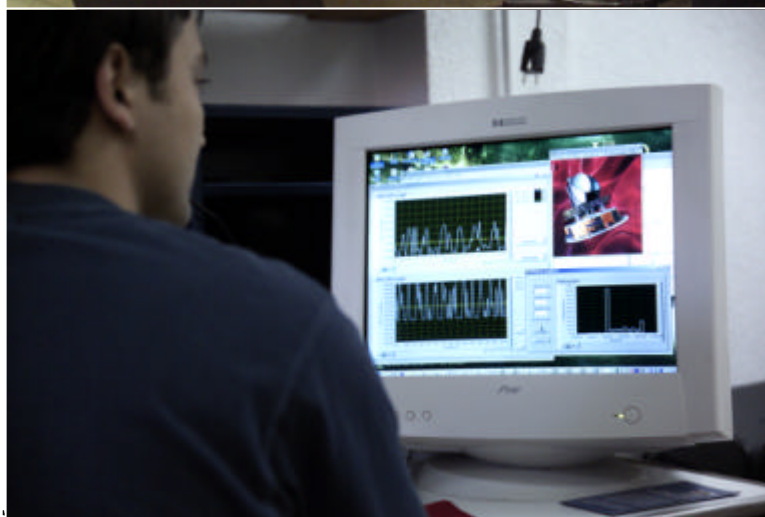
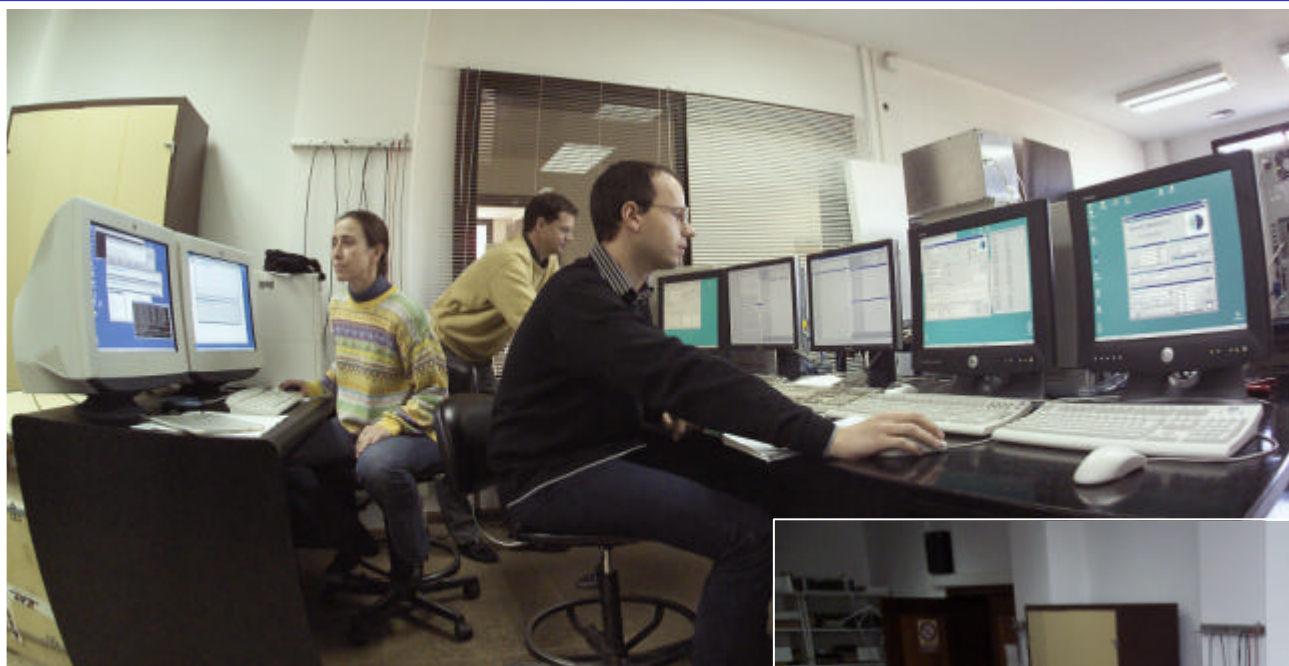


SPU DC/DC FM MODEL





SPU OBSW DEVELOPMENT SYSTEM





The contribution to PACS ICC



- **Collaboration in instrument calibration**
- **Interactive Analysis tools**
- **Development of a WWW for use by the Spanish astronomical community (in Spanish and English)**
 - Instrument information
 - Observation models
 - Data reduction

PACS - Mozilla



PACS / HERSCHEL
The IAC website for PACS





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[IAC contribution to HERSCHEL-PACS](#)

PACS- A Photodetector Array Camera & Spectrometer for Herschel

Introduction |

The PACS is one of three science instruments for ESA's Herschel Space Observatory (HSO, formerly known as FIRST). It operates either as an imaging photometer or an integral field spectrometer over the spectral band from 57 to 210 μm .

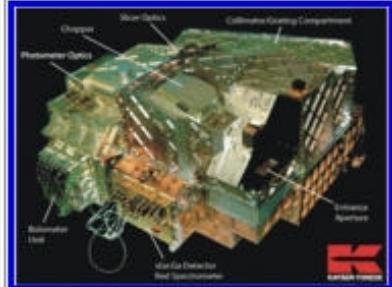
PACS is being designed and built by a consortium of institutes and university departments from across Europe under the leadership of Principal Investigator Albrecht Poglitsch located at Max-Planck-Institute for Extraterrestrial Physics, Garching, Germany. **Consortium members are:** Austria: UVIE; Belgium: IMEC, KUL, CSL; France: CEA, OAMP; Germany: MPE, MPIA; Italy: IFSI, OAP/OAT, OAA/CAISMI, LENS, SISSA; Spain: IAC. Visit the [official home page for PACS](#). **Principal Investigator:** Albrecht Poglitsch, Max-Planck-Institut für Extraterrestrische Physik. **Co-Principal Investigators:** Christoffel Waelkens, KU Leuven, Belgium. [Instrument Control Center:](#) PACS-ICC - operational nerve center and Project Office site at the PI institute in Garching, Germany.

PACS Quick Facts

Imaging Capabilities:

- Simultaneous two-band (same field of view) 60-85 μm or 85-130 μm and 130-210 μm imaging
- Two filled bolometer arrays: 32x16 and 64x32 pixels

PACS



Focal Plane Unit: Qualification Model

Click on the image for details

Herschel Mission





The IAC SPIRE rogues



Science & Engineering:

I. Pérez-Fournón (PI)

J.M. Herreros (PM)

E. Hatziminaoglou



IAC MAIN CONTRIBUTION TO SPIRE



- **Pointing package:**
 - Assign astronomical coordinates for each detector
 - Pointing for mapping mode
 - Technical documentation
 - User help
 - The Pointing Module is part of the SPIRE proto-pipeline
- **Maintenance and test at the IAC of the Herschel Common Science System**
- **Science preparation**



IAC MAIN CONTRIBUTION TO LFI



- Local management and instrument system engineering.
- REBA electronics equipment: data processing unit (DPU), signal processing unit (SPU), power supply unit (PSU), and data acquisition unit (DAU).
- Onboard software: application software, start-up software and low-level software drivers.
- On-board software compressor and ground software decompressor.
- 33 & 44 ghz radiometers: phase switch design and engineering support.
- Instrument assembly, integration and verification (AIV) engineering support.
- Ground science data processing for the LFI data processing center (DPC).