

LUVOIR

POSSIBLE IWF CONTRIBUTION

January 2017

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SPACE RESEARCH INSTITUTE AUSTRIAN ACADEMY OF SCIENCES

Since 40+ years engaged in the exploration of near-Earth space and solar system

About 100 scientists & engineers from 20 nations working in four research fields

- Space plasma physics
- Physics of exoplanets
- Solar system exploration
- Satellite Laser Ranging

using instruments, data, analysis and theory



IWF contributed/contributes to instruments for:

- CoRoT, Rosetta (3), MMS (3), Bepi Colombo (3), Solar Orbiter, CHEOPS

IWF will participate in:

- GK-2A, JUICE, Chinese Mars Orbiter, PLATO, CUTE

IWF INSTRUMENT DEVELOPMENT

Space Plasma Physics

- Magnetometer (cooperation with TU Braunschweig):
long term experience, development of ASIC in cooperation with Fraunhofer,
new development based on quantum effect
- Satellite potential control (cooperation with FOTEC):
ion emitter to compensate photo-electrons
- Electron drift instrument (cooperation with UNH):
coded electron beam to derive magnetic and electric field

Planets and Surfaces

- ROSETTA - MIDAS in cooperation with ESTEC
Atomic force microscope to scan cometary dust

Exoplanetology

- Boîtier Extracteur for the CoRoT mission
- CHEOPS Back-End-Electronics (together with RUAG)
- Router and Data Compression Unit for PLATO (part of the ICU)

Hardware Contribution

- Based on available experience and spin-off from other projects IWF could provide the DPU for the instrument controller

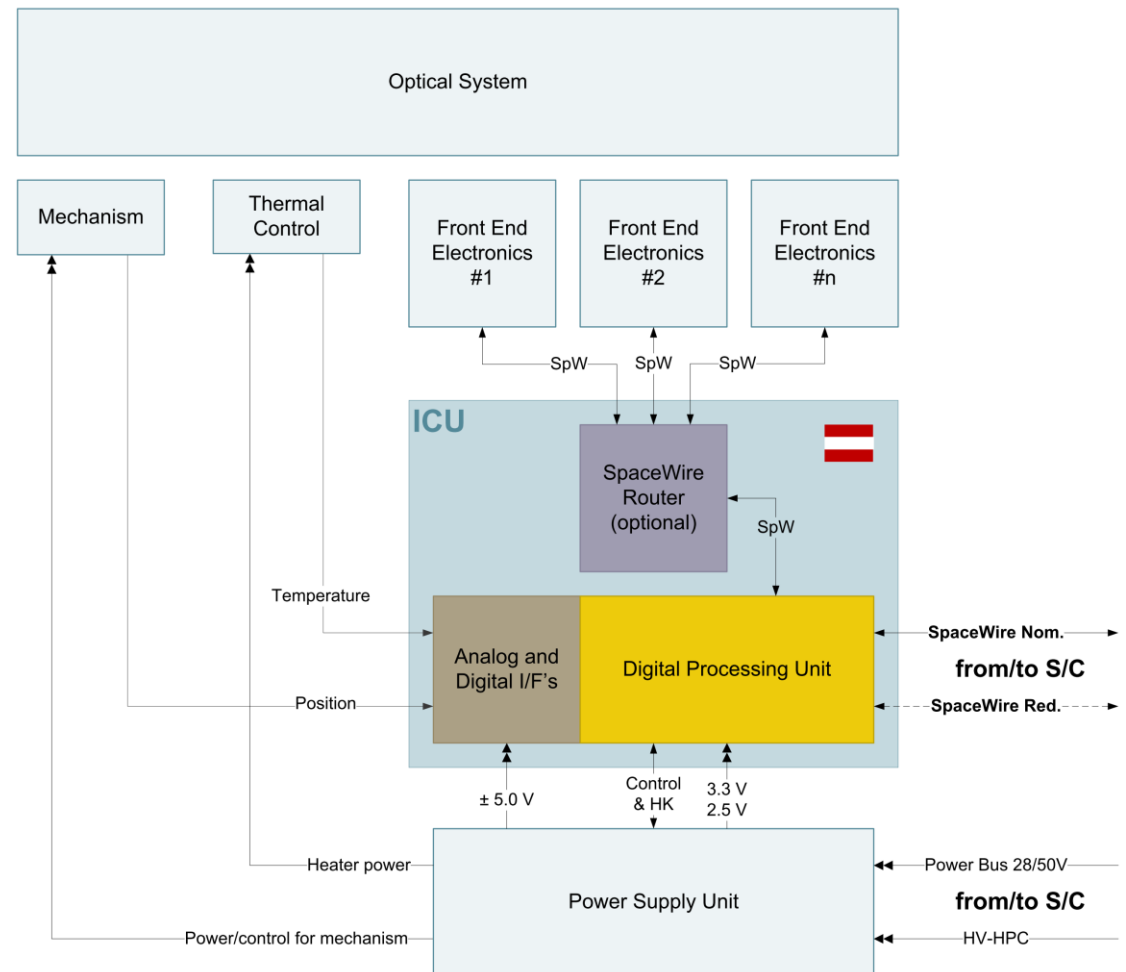
Limitations

- The commitment is limited to participate in the study
- The head of institute will retire in 2018 and the successor might change the focus of the research activities
- There is no money allocated presently,
BUT
- The institute contributes to the ATHENA WFI with a similar hardware
- Tests with evaluation boards or in-house bread-boarding are already foreseen for the upcoming two years
- Outcome of these tests could be directly used to create the preliminary design and derive the budgets

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Instrument Scenario

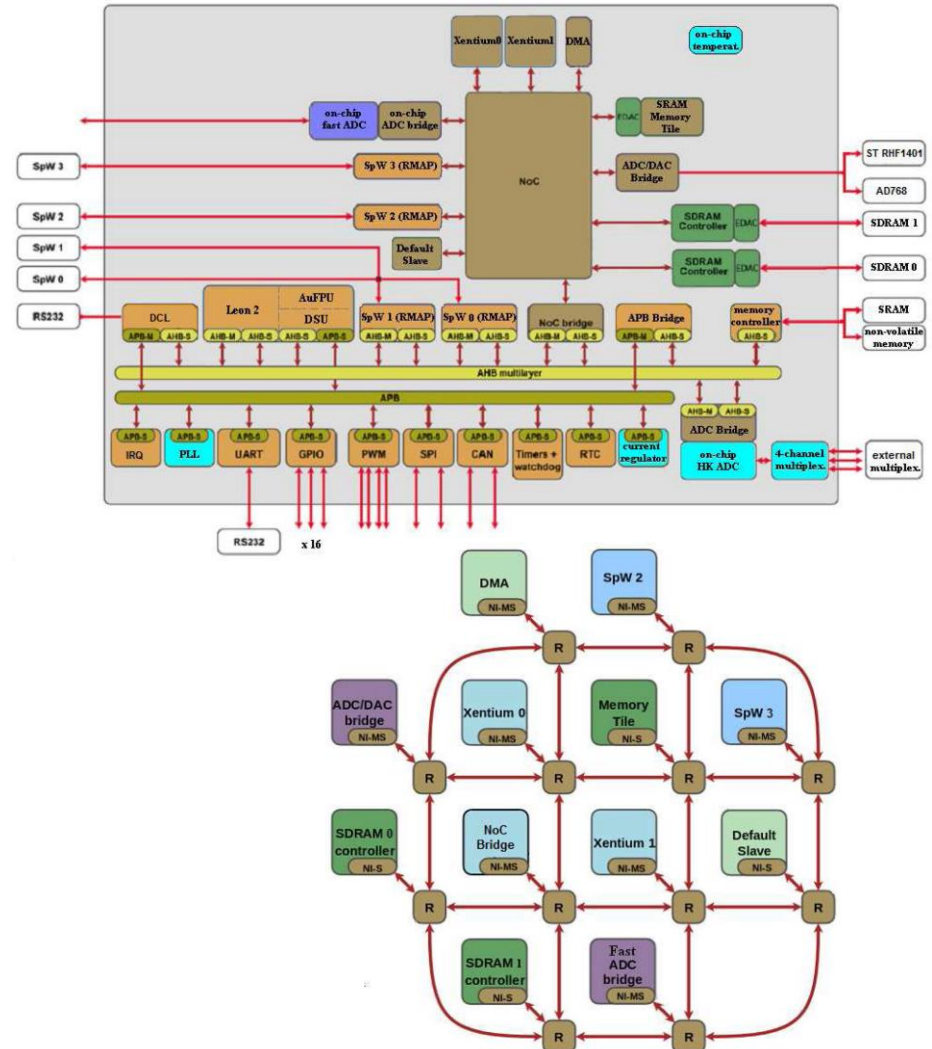
- Front-end electronics
 - Camera
 - Data pre-processing
- Instrument controller
 - Communication with S/C
 - Configuration of FEE
 - Control of mechanisms (door, filter, etc.)
 - Basic thermal control (not for the cameras)
- Power supply
 - Power for ICU
 - Power for FEE's ???
 - Heater power
 - Power for mechanism



KEY ELEMENTS (1/3)

Processor Solution 1: SSDP

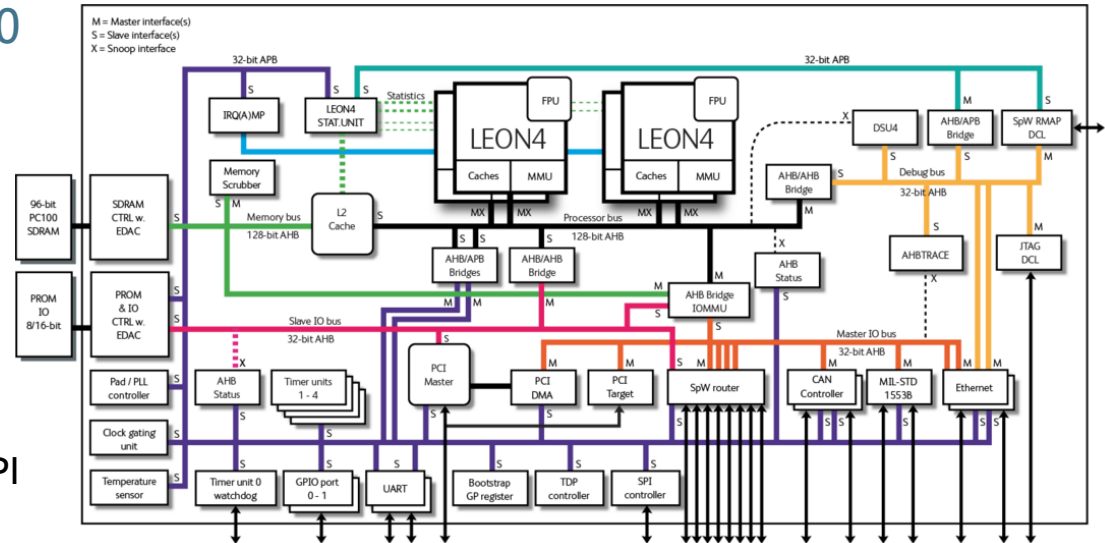
- Scalable Sensor Data Processor
- Presently under development by TASE (under ESA contract)
- Contains:
 - 2x Xentium DSP's
 - 1x LEON2
 - 4x SpaceWire interfaces (2x NoC, 2x AHB)
 - Support for DRAM
 - ADC for housekeeping
 - SPI, CAN, PWM, UART, GPIO
- System clock up to 100 MHz
- Status:
 - Components and development boards should be available soon



KEY ELEMENTS (2/3)

Processor Solution 2: GR740

- LEON4 quad core
- Contains:
 - 4x LEON4 with FPU
 - 8x SpaceWire interfaces
 - Support for DRAM
 - ADC for housekeeping
 - Ethernet, MIL-1553, CAN, SPI
 - UART, GPIO
- System clock up to 100 MHz
- Status
 - Component announced for Q4 2016



KEY ELEMENTS (3/3)

Memories

- PROM for boot S/W
- SRAM for application S/W and data
- Optional, based on data rates, processing needs etc.
 - DRAM for science data
 - Non-volatile memory for S/W images and calibration data (EEPROM, FLASH)

FPGA

- Reset circuitry
- Memory mapping
- Optional: CMD interface to power supply

SpaceWire Router (optional)

- Depending on number of FEE's and type of processor, an additional router might become necessary
- Heritage from PLATO