

Status of the GPS implementation in AMS

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Houston, AMSTIM, January 10, 2007

GPS in AMS02

- Science: variable γ sources

astrophysics – detect flares, measure pulsed emission
cosmology – Quantum Gravity (AGNs, GRBs, Pulsars)
– Dark Energy (?)

UTC time allows to relate our measurements with other missions

- Technical considerations:

- unique (UTC time) for all sub-detectors
- precise time of any technical problem in the detector and ISS

Implementation: underway

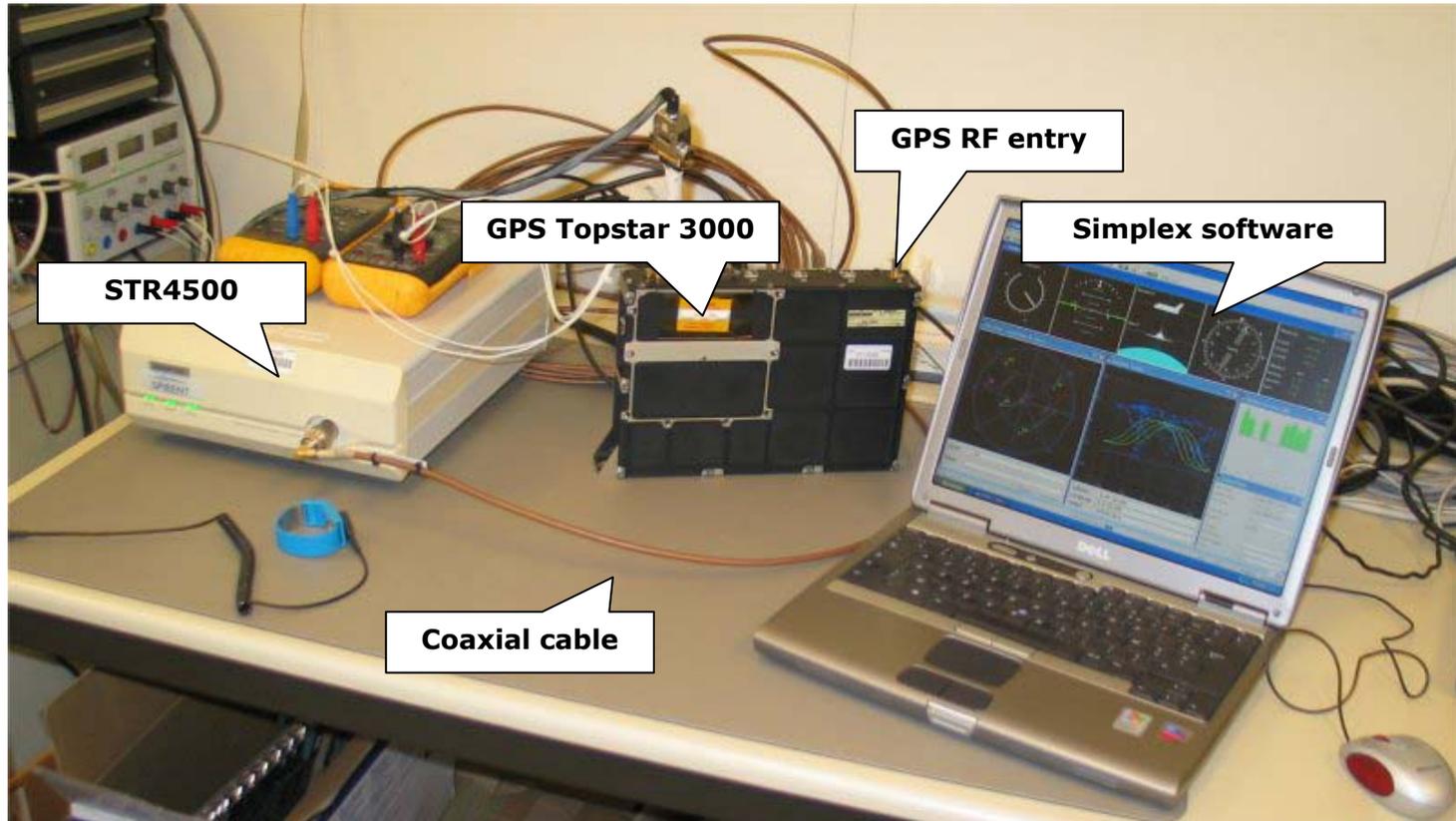
Tests with QM GPS at CERN: DEMETER and ISS orbital scenarios were investigated

- **Standard GPS data acquisition:**
 - **slave mode data: UTC time per sec (μ sec)**
 - **synchronized on p.p.s. signal**
 - **commands via GPSE card**
- **Initialization: cold startup 40-50min**
warm startup \sim 15 min (given Almanach)
- **Development of the monitoring procedures:**
 - **free mode data**
 - **UTC time, Quality Estimator and flags**
 - **stability of the internal clocks studies to be continued (to define frequency of calibration data to be taken during flight)**

Analysis of data going on, documentation prepared by C. Zurbach
Last test with QM GPS was in November 2006

Tests of QM module

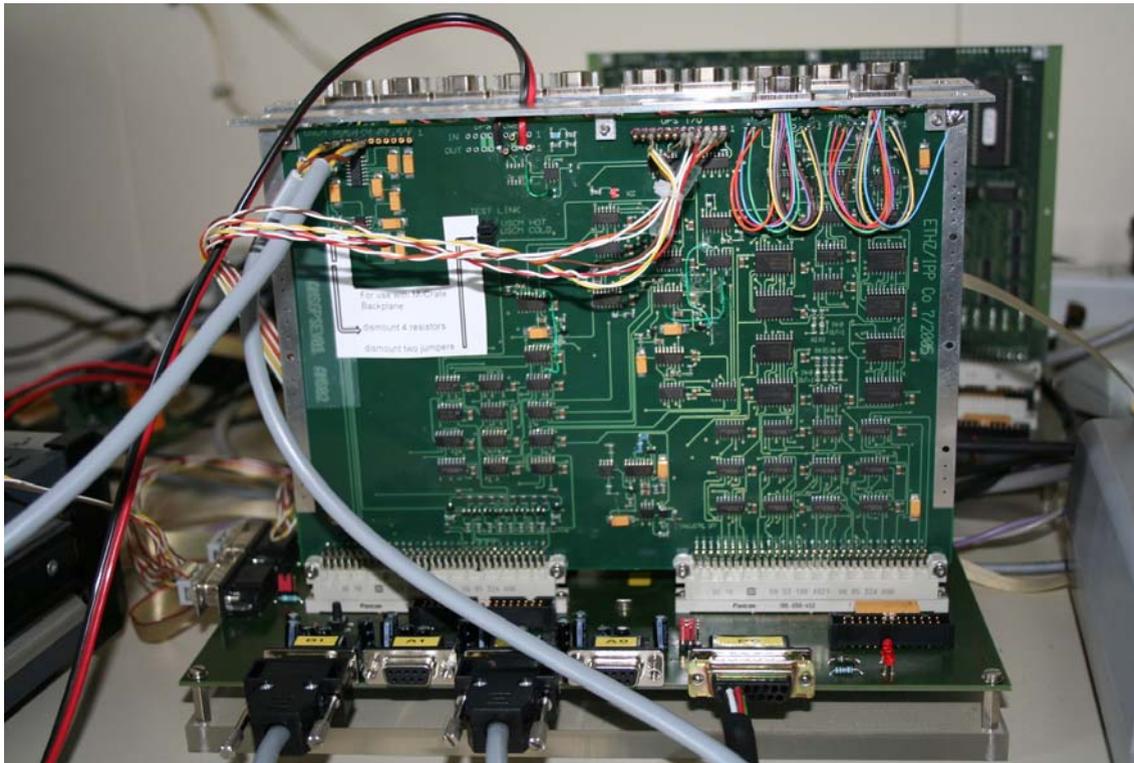
Architecture of RF simulation on ISS - orbital flight



GPSE card status

- **All functions are present now on the prototype card**
- **The QM, FM and SM will be produced – a company was found (G. Viertel) and order was sent in December**

GPSE prototype (1st version) designed by V. Commichau



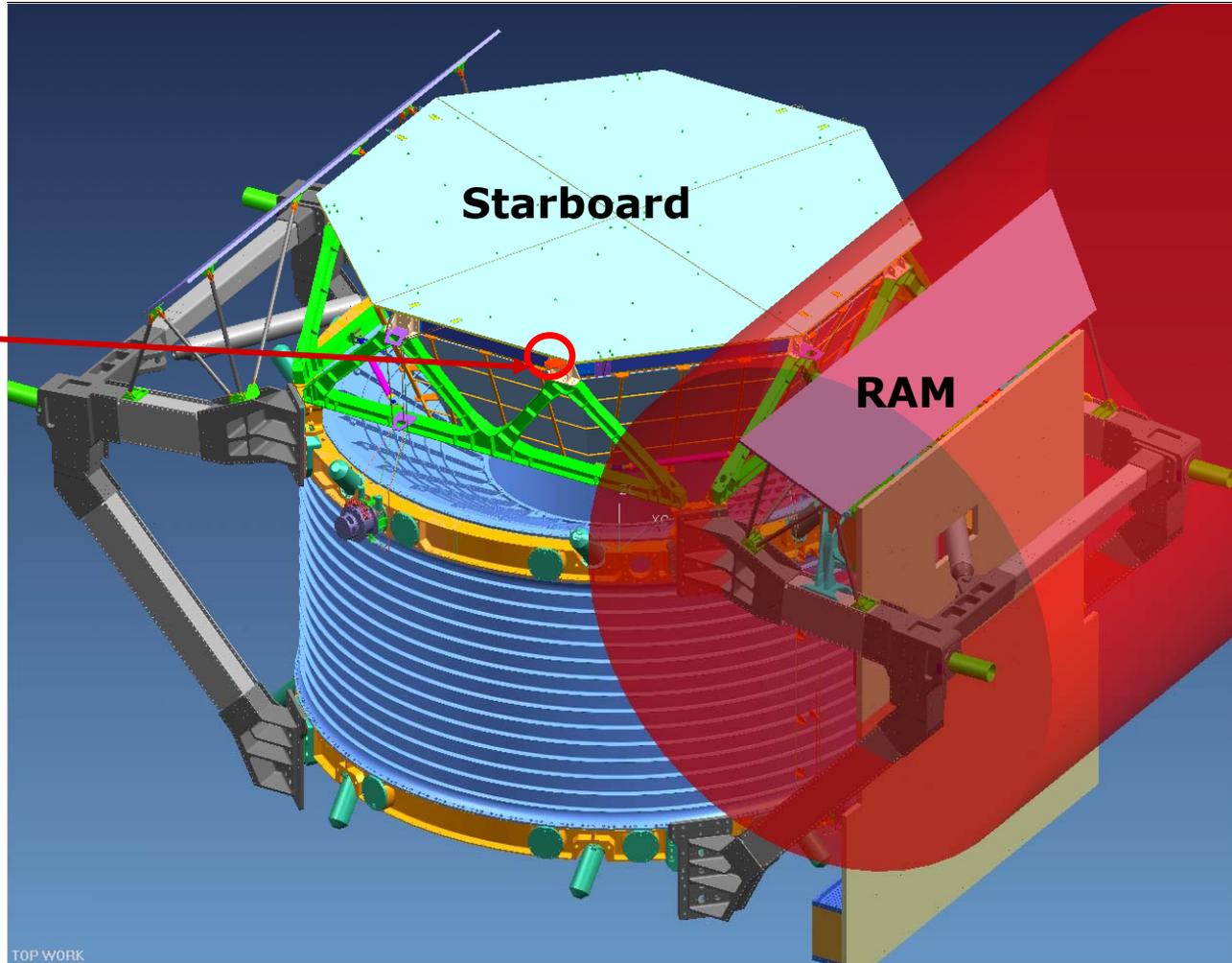
Implementation of antenna

- GPS antenna is a harmless Al disk of 120g
 - It should be implemented at a distance $< 2\text{m}$ from the GPS which is situated on the RAM radiator
- Proposal from K. Luebelsmeyer and R. Becker: accepted
TRD bracket
impact on TRD MLI is being investigated

Implementation of antenna

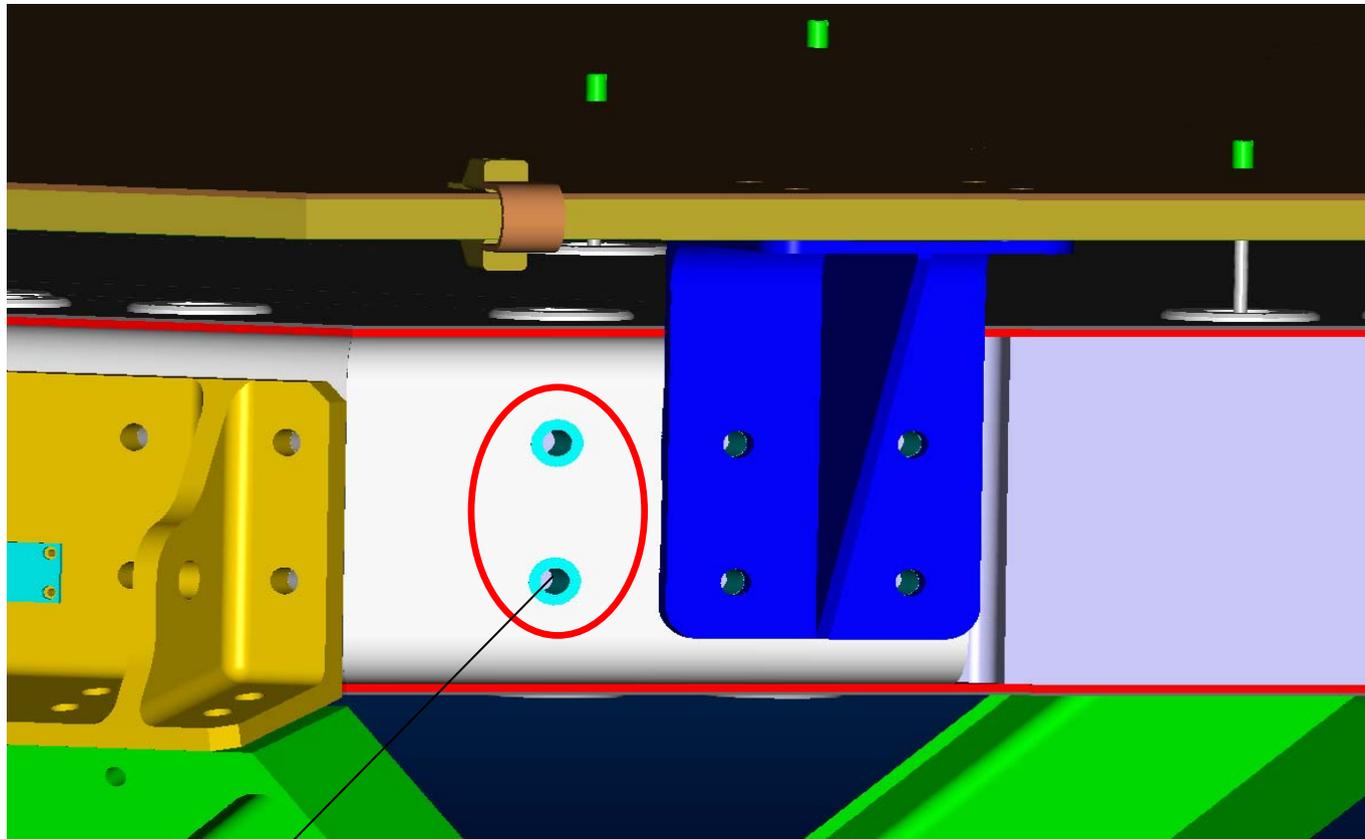
Proposal from K. Luebelsmeyer and R. Becker

19/07/2006



Implementation of antenna

Last proposal



2 threadholes $\frac{1}{4}$ -28 UNRF available for GPS
Antenna mounting

Work done by:

Project management

A. Jacholkowska, C. Zurbach

Delivery of GPS fight module, antenna and GPS-antenna cables

A. Jacholkowska, C. Zurbach

GPS control-command software

C. Zurbach

Implementation and synchronization software in DAQ and Trigger

A. Lebedev

Tests with GPS QM module

C. Zurbach, M. Grondin, A. Lebedev

GPSE card design and production

V. Commichau, A. Lebedev

Implementation in the AMS structure

R. Becker, K. Luebelsmeyer + NASA

Planning: milestones (1)

- Tests with GPS QM module from CNES end-up in 2007
loan of orbit simulator
and of QM module ensured by the **MoU with CNES**
 - tests of the DAQ/Trigger synchronization and time-stamp setting for each event
 - monitoring of the GPS modulework on both items well advanced
- Antenna position in AMS02 is definitely fixed on the Zenith radiator bracket
thermal simulations underway by CGS
- GPSE card QM, FM and SM have been ordered (December 2006)
- cables: antenna-GPS to be ordered in January 2007 (LPTA)
GPS-GPSE cables to be ordered in 2007 (MIT)

Planning: milestones (2)

- GPS Flight Module delivery to CERN in January 2007
Delays occurred due to changes in delivery place, which is now defined at CERN (M. Capell)
- Clean Room needed for tests and implementation of the Flight Module → ***startup date could be June 2007***
- ***Aim: GPS fully implemented in AMS02 in fall 2007***