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solar orbiter

MAG: Measuring the heliospheric magnetic field

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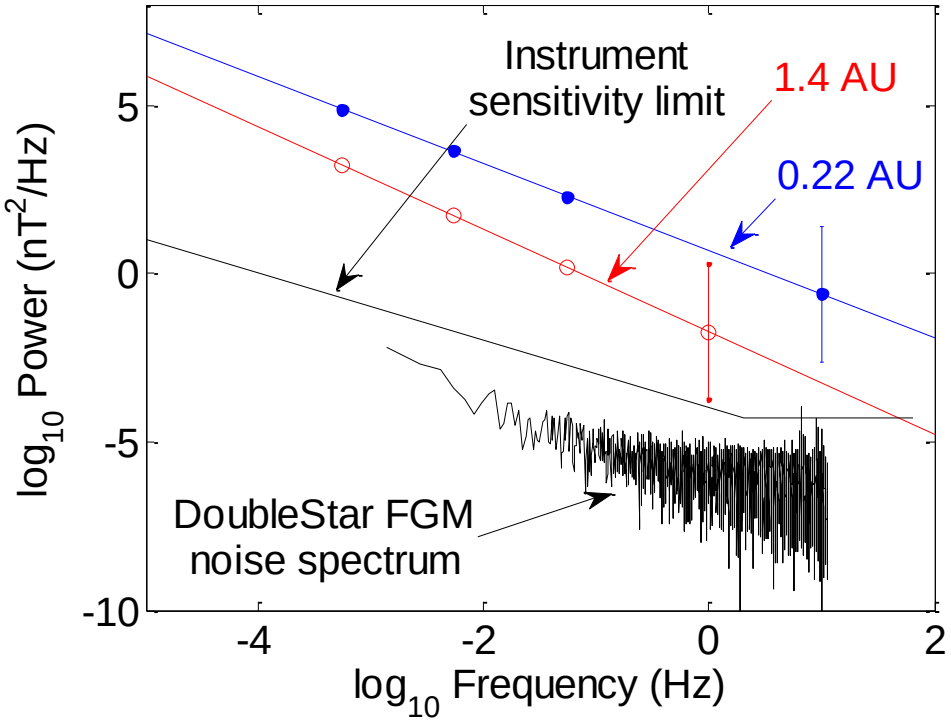
Solar Orbiter magnetometer: requirements

- **Time resolution**
  - Bulk plasma: 16 vector/s
  - Kinetic physics: 128 vectors/s burst
- **Low noise**
  - Order of magnitude below natural signal throughout the orbit
  - 10 pT $Hz^{-1/2}$ at 1 Hz
- **Absolute field**
  - Calibration: two sensors
  - Low and stable spacecraft and instrument magnetic fields



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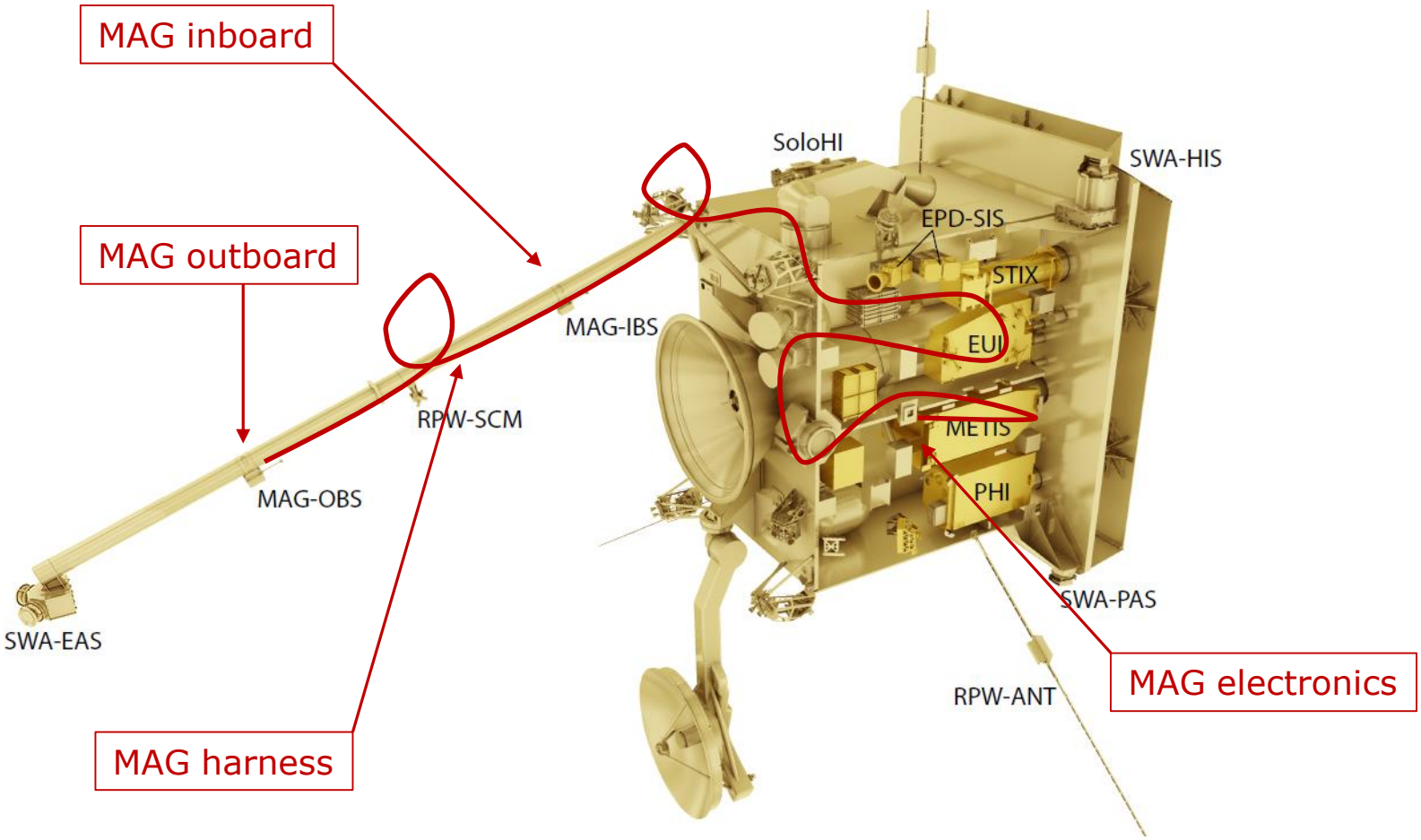
Solar Orbiter magnetometer: configuration



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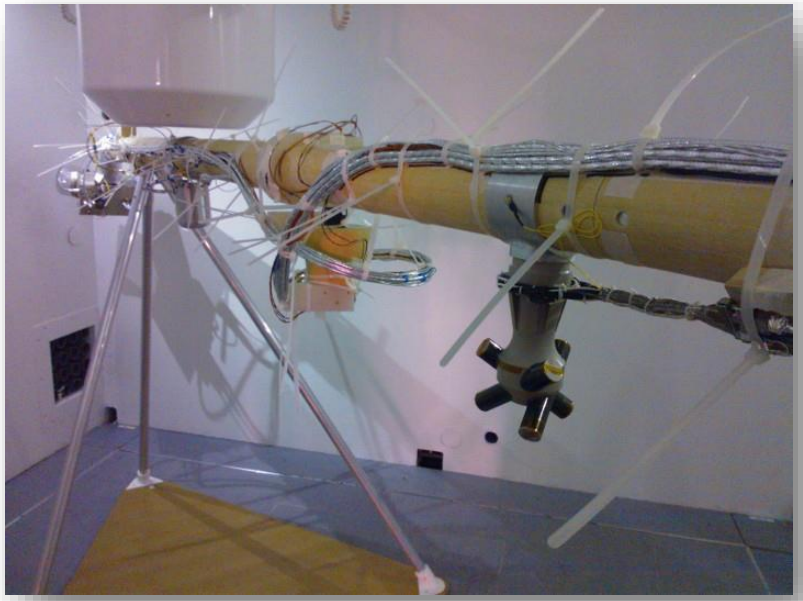
Solar Orbiter magnetometer: challenges

- Thermal
  - +80C to -190C on boom
- Mechanical
  - High vibration levels on launch
- Resources
  - Mass, power, telemetry
- Software
  - Reliability, low resource processor
- Magnetic cleanliness
  - Other instruments
  - Spacecraft sub-systems



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Solar Orbiter magnetometer: operational philosophy

- Always on
  - Vital to have 100% coverage
- Auto-ranging
  - Maximise precision as field magnitude varies
- Burst mode
  - 16 vectors/s most of the time: MHD, proton gyroscale
  - Burst mode: 128 vectors/s, ~ 1 hour per day
  - Trigger off RPW shock detection algorithm
  - Internal shock trigger (TBD)
- Low latency data
  - 1 vector every 8s within 24 hours
- Real time onboard data
  - To SWA for reduced data products

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Solar Orbiter magnetometer: status

- Electrical model: final twiddles
  - Expect delivery to Airbus DS in November
- Sensors
  - Failed vibration test
  - Understand the issue, fixed
  - New test soon, expect to pass
- Software
  - Lots still to do
- Next
  - Qualification model
  - Final(!) electrical fixes
  - Near-identical to flight model
- Flight model
  - Delivery December 2015