Space Debris Detection with ADLER-1

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7 km/s-impact 1,7 g (1,2 cm) Al-sphere → Al-Block

SOURCE: ESA
ADLER-1 Mission

- 3U (30x10x10cm) cubesat IOD
  - Funded by: Findus Venture; Austria
  - Scientific lead and payloads: Austrian Space Forum
  - Satellite Bus & Ground station network: SPIRE Global US/UK/LUX
  - Registered in Luxembourg as LEMUR-2 KRYWE, launched in US

- Mass: 6 kg (payload: 1.5 kg)

- Capacity building for the Austrian Space Forum & SSA
- Launched in Jan2022 (ca 15 months from idea to orbit)
- Orbit: LEO/SSO @ 480 km

- 2 Instruments
  - APID/Austrian Particle Impact Detector
  - PL2/CW Radar
Piezoelectric Sensors
• Mech-electrical conversion:
  12 mV/microstrain, 400 mV/μm
• particle: <100μm @ 10 km/s

Configuration
• 2 wings with 12 sensors @ 60 x 65 mm
• Total surface: ca 865 cm²
ADLER-1/RADAR

Configuration
• 1 Watt CW Radar @ 78 GHz,
• Processor Xilinx Zynq FPGA Architecture
• 1,6mm thick antenna, 3d printed

Particles
• Size: >1mm @ 15 km/s
• Range: ca 50m (α RCS) for Radar-echo & Doppler
• Effective cross section: 150 m²
ADLER-1 APID Signals

Time of impact: 01May2022, 13:06:42.6257866 UTC
• Velocity of the satellite: 7627.583 m/s
• Corresponds to 479 km, Mid-Atlantic between Guinea & French Guiana.

• Ca 550,000 data packages received so far (01Jun2022)
• 9 suspected impacts so far
We enable to live the passion for space.

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