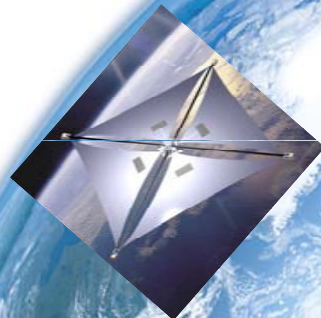


IAA-PDC-15-P-20

Large Lightweight Deployable Structures for Planetary Defence: Solar Sail Propulsion, Solar Concentrator Payloads, Large-scale Photovoltaic Power

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Knowledge for Tomorrow



Ultra light weight deployable membrane structures

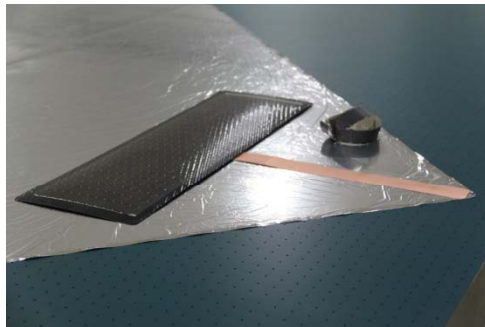
- Launch mass saving
- Mission propellant saving
- Basis for re-thinking existing and new mission concepts
- Scalable technology
- Controlled Deployment

Use Cases

- Solar sailing, lightweight high Δv missions
- Ultra-lightweight solar power generation for mass critical and high power demand systems
- drag sail to deorbit spacecraft from LEO
- large reflectors for communication, science and solar thermal applications

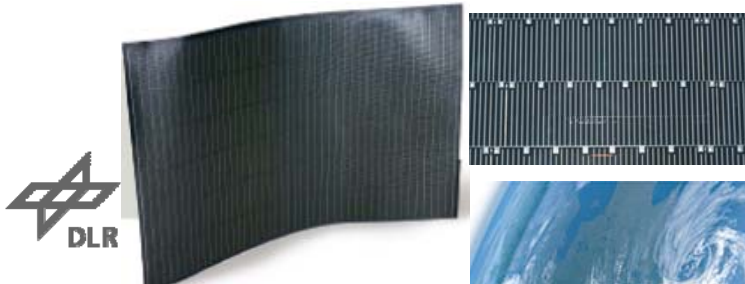


Deployment & Configuration



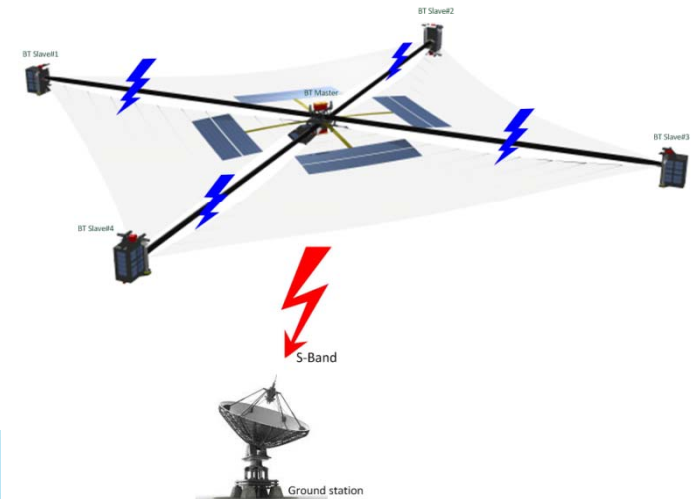
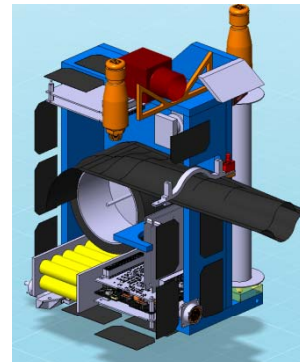
Sails

- Aluminum coated polyimide foil
- Additional protective oxide coatings
- Load introduction analysis and interface design
- **Embedded thin-film photovoltaics**



Qualification Testing

- Boom characterization test rig
- Vibration Testing
- Centrifuge Testing
- Fast Decompression
- Thermal Vacuum
- Laboratory Deployment



Configuration

- 4 sail segment, crossed booms
- 4 independent deployment units
- On board wireless communication between independent units



Thank you for your attention

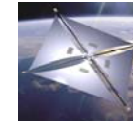
– see you in the poster session

our posters & talks – DLR @ PDC 2015

- IAA-PDC-15-04-08 *S. Ulamec et al*
Relevance of PHILAE and MASCOT in-situ Investigations for Planetary Defense



- IAA-PDC-15-04-17 *J.T. Grundmann et al*
From Sail to Soil – Getting Sailcraft Out of the Harbour on a Visit to One of Earth's Nearest Neighbours



- IAA-PDC-15-P-20 *P. Seefeldt et al*
Large Lightweight Deployable Structures for Planetary Defence: Solar Sail Propulsion, Solar Concentrator Payloads, Large-scale Photovoltaic Power



- IAA-PDC-15-P-64 *J.T. Grundmann et al & the MASCOT Team*
Mobile Asteroid Surface Scout (MASCOT) – Design, Development and Delivery of a Small Asteroid Lander aboard HAYABUSA2



- IAA-PDC-15-P-65 *C. Lange et al*
Technology and Knowledge Reuse Concepts to Enable Responsive NEO Characterization Missions based on the MASCOT Lander



- IAA-PDC-15-P-66 *C.D. Grimm et al*
On Time, On Target – How the Small Asteroid Lander MASCOT Caught a Ride Aboard HAYABUSA2 in 3 Years, 1 Week and 48 Hours

