AIRBUS

Call for pitches – Guidelines for R&T topics

Topic of interest: Spacecraft Electrical Systems

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Short description of research topic:

The research should address topics around spacecraft electrical systems, with primary interest on solar power generation, Energy Storage and Spacecraft power distribution.

Detailed areas of research proposed:

Proposals shall address R&T in the a.m. field with special interest in, but not limited to the following areas:

Power Generation with focus on:

- Solar cells with very high efficiency (>35%) and/or low radiation degradation

- Space graded cost efficient solar cells with high efficiency

- Cost efficient Solar Generators/ deployable structures with low mass, and low storage volumes, with special interest in the range of 300 W - 2000 W/ wing, equivalent to 1 - 10m² deployed surface area.

Electrical energy Storage systems with focus on:

- Battery condition monitoring, esp. determination of actual capacity (State-of-Health or SoH) and stored energy (State-of-Charge or SoC). This includes hardware (BMS) and software developments.

- Energy Storage new technologies (Batteries and/or Supercapacitors), focusing on very high energy/power densities, combined with a very high number of cycles.

Power conversion

- High voltage active components compatibles with radiation environment and high frequency operation

Power Distribution within the spacecraft with focus on:

- support harness design approaches helping to reduce mass, reduce integration effort, improve spacecraft flexibility (e.g. modular design)

- Printed power harness, incl. connections and testing and repair topics

- Harness components for high voltage applications: space qualified connectors for operating voltage up to 2000V (qualification according to ESCC-3401 and ECSS-Q-ST-30-11C or equivalent).

Combination of a.m. topics, like structure integrated batteries are also within the scope of the call

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Target results foreseen (e.g. maturity level to reach, deliverables to produce, estimated timing, etc.):

As the a.m. topics have already different maturity as SoA, the targeted results range from low TRL (proof of concepts & principles) up to prototype demonstration, also dependent on the character of the proposed idea.

The following targets shall therefore be regarded as initial idea only:

Solar Cell research – Proof of concept in Laboratories

Solar Generator – (scaled) Prototype demonstration

BMS – Proof of concept with prototypical demonstration

Batteries/Supercapacitors – Prototype cells to be tested

Power components: SiC or GaN components tests, new components structures studies

Harness – Tools should target prototypical operational level; Proof of concept & benefit confirmation for concepts

Printed power Harness – small scale integration; Prototype demonstrator

Connectors – tested Prototypes or qualified Components

Other relevant aspects to consider (e.g. previous experience required working in Defence and Space sector, access to specific facilities or laboratories, etc.)

Regarding Solar Cells development, alignment with already running activities at UNSW shall be shown.