

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Extended Mission (9)

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REDEMPTION: A STUDENT EXPERIMENT PROPOSING A SOLUTION TO ACTIVE DEBRIS
REMOVAL**Abstract**

REDEMPTION (REmoval of DEbris using Material with Phase Transition: IONospheric tests) is a student experiment aiming to propose a feasible solution for Active Debris Removal. Completely conceived, designed and realised within the Space Robotic Laboratory (SRL) of the II Faculty of Engineering of the University of Bologna "ALMA MATER STUDIORUM", REDEMPTION has been selected to participate to REXUS/BEXUS 2012 Programme. This programme is realised under a bilateral Agency Agreement between the German Aerospace Center (DLR) and the Swedish National Space Board (SNSB). The Swedish share of the payload has been made available to students from other European countries through a collaboration with the European Space Agency (ESA).

REDEMPTION experiment base-concept is definitely up-to-date, as at the moment space debris problem is one of the most challenging space research field: at the moment the situation of debris population is quite critical, because every new collision produces at its time other satellite fragments, arising the total number of debris and making more likely the probability of a new impact (the so-called Kessler-Syndrome). Due to the complexity of the task, no feasible solution has been found so far. One of the most critical aspects to be solved in debris removal framework, is how to connect the debris to be removed to the cleaner satellite. On this matter, through REDEMPTION experiment students aim to evaluate the feasibility of an ADR system based on a polyurethanic foam. The foam under evaluation is generated starting from two liquid reagents, that need to be mixed to produce a polymeric structure that after a short time becomes solid and rigid. The opportunity to launch the experiment onboard REXUS rocket allows to verify the behaviour of the foam in near space conditions, that is milli-gravity and vacuum conditions.

In this paper the educational aspects of the project is depicted, as well as the technical details regarding

the three sub-experiments which constitute REDEMPTION module. Moreover, the results of the launch campaign will be discussed, drawing the conclusions of the project.