

# BETs

## Propellantless deorbiting of space debris by bare electrodynamic tethers

### SAFE RETIREMENT FOR SATELLITES

Waste is a growing problem in space. Old satellites collide and create increasing amounts of debris, which is a risk for functioning satellites and the International Space Station (ISS). The BETs project proposes an innovative deorbiting system for future satellites.

Since 1958, some 6000 satellites have been launched into space. Today, only about 800 are still in operation. So thousands of retired satellites orbit Earth; out of fuel, most are out of control, and as such represents hazards for functioning satellites and the crew on the International Space Station (ISS). Moreover, collisions between such satellites multiplies the space waste challenge, creating larger amounts of smaller yet still potentially very harmful space debris.

The need to implement an effective deorbiting system for satellites that retire in order to limit the sources of future space debris has been recognised, and the BETs project responds to this demand with a proposal for an efficient deorbiting system that can be carried on future spacecraft.

The project is focused on a single but ambitious long term objective: the study and design of an electromagnetic tether to be deployed by spacecraft at the end of their useful lives to remove orbital energy, and thereby decrease altitude, leading the faster re-entry and subsequent destruction of the old satellite in Earth's atmosphere.

BETs proposed system involves magnetic drag on a current-carrying conductive tether. The system uses no propellant and no power supply.

The project is determined to develop its concept onto Technology Readiness Level 4-5, undertaking ground tests in a representative environment. It would pave the way for the eventual design and deployment of an operational tether in space, which would have the length of some 4-10 km when unfolded.



**JUAN R. SANMARTÍN**  
IS PROJECT COORDINATOR



Crowded Space © Paul Fleet - Fotolia.com

**BETs aims at developing an efficient deorbit system for future spacecrafts.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

To provide a deorbiting system, which is both passive as enhanced air-drag but 10000 times smaller in Front-Area $\times$ Deorbit-Time, and active as rocket/electrical-thrusters, but 30 times lighter

#### Why is this project important for Europe?

Europe will be at the forefront of a technology development of universal application. Europe will head a technical, social, and political movement culminating in approval by the UN Committee on the Peaceful Uses of Outer Space.

#### How does your work benefit European citizens?

European citizens will find space clean for use in multiple ways, which otherwise would be dangerously filled with debris originated in increasing proportion in other political entities.

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## LIST OF PARTNERS

- Universidad Politécnica de Madrid, Spain
- Università di Padova, Italy
- ONERA-Toulouse, France
- Colorado State University, United States
- Emxys, Spain
- DLR-Bremen, Germany
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## PROJECT INFORMATION

Propellantless deorbiting of space debris by bare electrodynamic tethers (BETs)

Contract no: 262972

Starting date: 01/11/2010

Duration: 36 months

EU Contribution: € 1.772.801

Estimated total cost: € 2.337.317

