

## Laboratory Ablation Experiments

Stefan Löhle

The plasma wind tunnel facilities at the Institute of Space Systems (IRS) of the University of Stuttgart have been developed for the qualification of thermal protection systems for atmospheric entry manoeuvres into the Earth's atmosphere. A particular and unique condition was found, which allowed the analysis of the superorbital return of the Hayabusa capsule using various spectroscopic tools. Moreover, this flow condition is suitable for the analysis of meteoroid entry processes.

During a cooperative campaign with colleagues from Paris Observatory, CEREGE in Aix-en-Provence, the Laboratory of Astrophysics of Marseille, several meteorite fragments were tested in the corresponding flowfield (see Figure). Spectral data, thermography imaging, high frame rate imaging and high resolution photography were set up simultaneously in order to protocol the meteoroid ablation features in detail. The analysis of the spectral data and their comparison to observed spectra during actual meteoroid entry was tried in order to allow a distinction between different fragments. The temporal evolution of the ablative processes is of interest for the understanding of the chemical changes occurring during the meteoroid entry.

A second campaign was realized in cooperation with colleagues from the Comenius University in Bratislava. These measurements included the observation of the ablation with their spectroscopic system usually in operation for the observation of the night sky. These experiments allow another comparison of ground testing to the real flight.

The talk will provide insight into the testing logic, the experimental setup and the different diagnostic techniques. The experiments will be presented and the spectral analysis will be provided for further discussion.