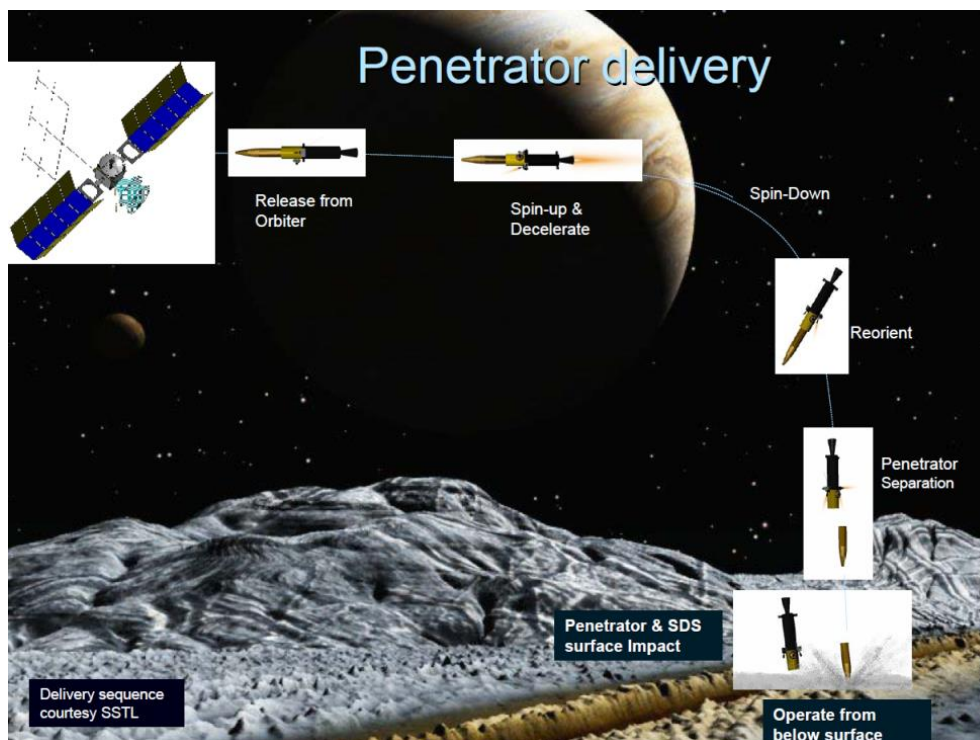


Bachelor-/Project-/Masterarbeit

High accuracy planetary penetrators

Penetrators are bullet shaped vehicles that are designed to impact a planetary surface at high velocity, and perform scientific measurements after they are implanted in it in some depth. There are targets for penetrators in the solar system where the location to be sampled lies in a concentrated area, and a certain shallow depth under the surface. Such targets include, among others, water ice within permanently shadowed regions of the Moon (cold traps), the gully features observed on the surface of Mars, and terrain features in Europa marking possible recent transport of ocean material to the surface. These interesting features range in size, from 10 km to under 1 km. Due to severe chemical degradation from the radiation environment, samples acquired from the very surface will not compositionally represent the ocean. Planetary penetrators would thus be ideal for subsurface sampling of these interesting areas. Penetrators proposed up to now however have a landing accuracy in the order of 20 km and therefore do not satisfy the accuracy requirements to reach the above interesting areas.

In this work, concepts for planetary penetrators with increased landing accuracy will be designed to enable access to astrobiologically interesting targets. We will give particular attention to the driving aspects of guidance, navigation, and trajectory control.



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