72320 Roversystemtechnik
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Phase 0/A-Study of a Rover Mission on the surface of the Jupiter moon: Europa: INSPIRE

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Symbols

a	nm	Constant for the Geometry of a Porous Media
h_{Ice}	km,m	Ice Crust Surface Thickness on Europa
T_{Surface}	K	Surface Temperature on Europa
ϵ	-	Emissivity
ρ_{Ice}	$\frac{\text{kg}}{m^3}$	Inner Encoder Ring Diameter

Abbreviations

PCDU	Power Control and Distribution Unit
2D	Two Dimensional
3D	Three Dimensional
IMU	Inertial Measurement Unit
IRS	Institute of space Systems at the University of Stuttgart
ESA	European Space Agency
SPENVIS	SPace ENVironment Information System

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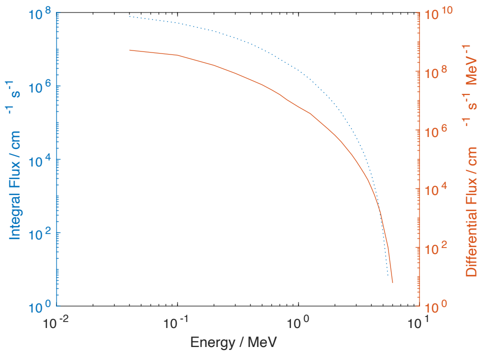
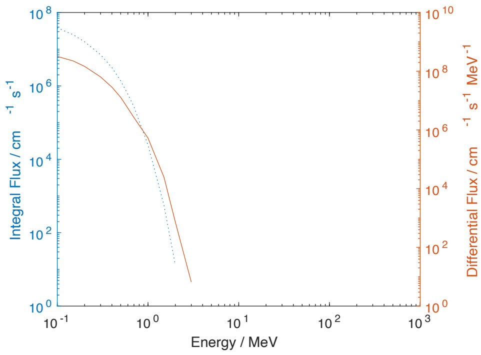
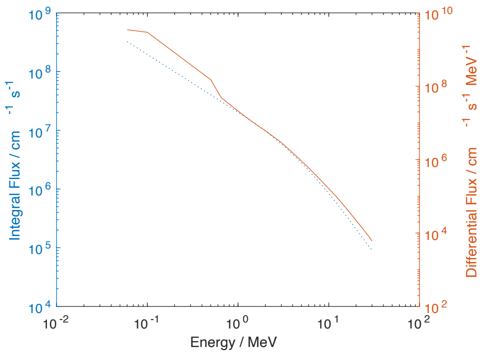
Compared to the radiation environment near Earth the radiation environment near Jupiter is multiple times stronger. It has the highest radiation levels of any planet in our solar systems [**Platzhalter**]. In order to survive these harsh environmental conditions, special emphasis must be placed on the radiation protection. In Figure 3.1, the average trapped proton and electron fluxes on Europa's orbit around Jupiter are shown in comparison to the outer Van Allen radiation belt around Earth. However, in contrast to the Van Allen radiation belt, the duration within the radiation environment on Europa cannot be minimised and the rover has to be designed to withstand the entire mission duration of 30 days.



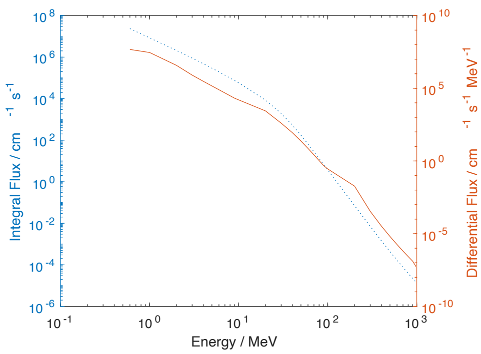
(a) Average spectra of trapped electrons around Earth.



(b) Average spectra of trapped protons around Earth



(c) Average spectra of trapped electrons around Jupiter



(d) Average spectra of trapped protons around Jupiter

Figure 3.1: Average trapped proton and electron fluxes on an orbit around earth at 25,000 km, through the outer Van Allen radiation belt, and on Europa's orbit around Jupiter.

In oder to design and evaluate different radiation protection approaches, different calculations have to be performed. For this purpose the ESA SPace ENVironment Information System (SPENVIS) is used [**Platzhalter**]. All calculations and figures in section 3.7 are performed with SPENVIS unless otherwise stated.

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