Simulation of response matrices for small/nano satellites

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Currently 2 CubeSat mission with Czech roots with ambitions of detecting gamma-ray bursts are flying overhead: GRBAlpha and VZLUsat-2. We have only some preliminary estimates of their interaction with cosmic radiation as well as the gamma-rays themselves. A proper simulation is required to understand various effects that were observed in real observations: efficiency of source detection, variations in background level or appearance of activation lines.

What you need:

- learn about interaction of X-rays with detector (anorganic scintilator)
- learn about interaction of charged particles with satellite body (background estimation)
- learn how to simulate all this with `GEANT4` (or higher level libraries as `MEGAlib`)

What we need:

- calculate response of detector depending on direction/energy
  - application for direction determination (this result could be of general interest = reasonable opportunity for publication)
- calculate effects of shielding (detectors, electronic)
- understand variable levels of background, influence of isotope activation

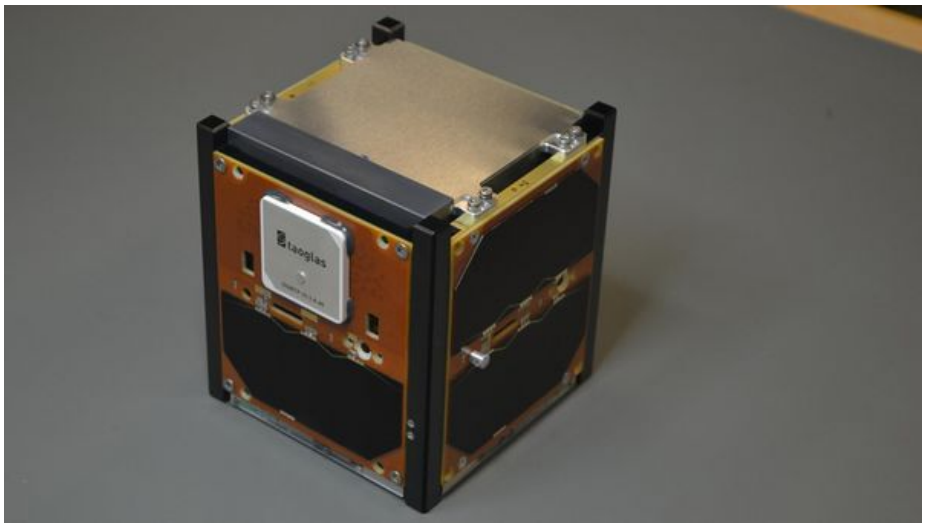
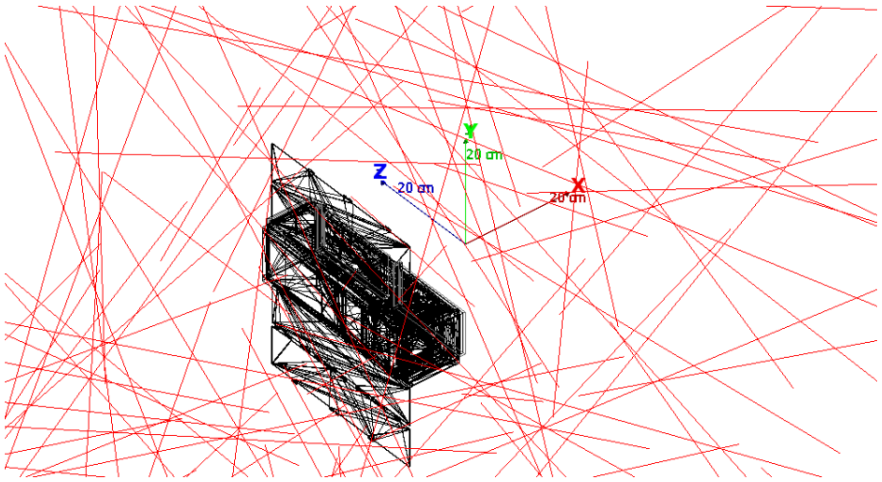


Figure 1: GRBalpha

In past, detailed studies were performed by Hungarian colleagues (G. Galgoczi) on a larger-scale mission (but still in preparaton) called CAMELOT. An extension of these efforts to relatively similar missions could profit of a vast experience gained and in some cases even build on common inputs (e.g. concerning influence of atmospheric albedo).



On the other hands knowledge of fully-fledged particle interaction simulation in space environment is highly-valued skill for many other projects of fast growing space community in Brno region.