

# Monte Carlo Simulations of Cosmic Photons, Neutrons and Protons interactions with the Polar detector

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The work on the simulations of photons, neutrons and protons consists principally on three steps.

## 1. MCNP6 code installation on the personal computers and computer clusters.

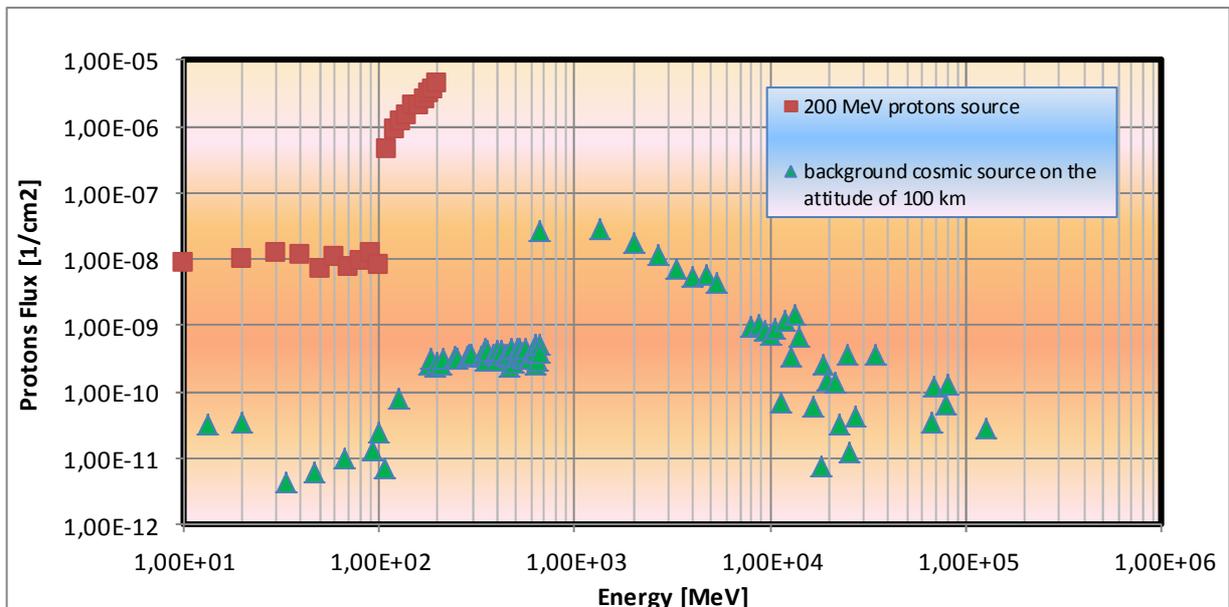
The main reason of buying the MCNP6 code was new Cosmic-Source option implemented in it. MCNPX and MCNP6 versions have been installed on two PCs under Windows7 operation system and in Swierk Computing Centre under Linux system. The calculation were preformed mainly in CIŚ, using 256 processors for the parallel simulation of photons, neutrons and protons interacting with Polar detector.

## 2. Geometric model of Polar detector for MCNP simulations.

The Polar model for the simulation of energy deposition curves has been developed. Model consist of 25 identical units. Each of it contains set of 64 scintillators, of dimension 5.6mmx5.6mmx170mm. All important elements of the real detector were taken into account. The model of the space station Tiangong2, with detector Polar fitted to it's surface has been also developed.

## 3. Monte Carlo calculations of absorbed energy in Polar detector.

Spatial and energy deposition calculation were performed for following sources of radiation: Cs, Gamma-ray burst, source of 200 MeV protons, background cosmic sources on the attitude of hundreds km above Earth surface. The knowledge of absorbed energy distribution in different elements (especially in electronic elements) of Polar detector, can be used to predict the radiation damage of this elements. The illustrative chart, created basing on calculations, is enclosed below.



**Fig.1** Protons spectrum inside one scintillator.

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