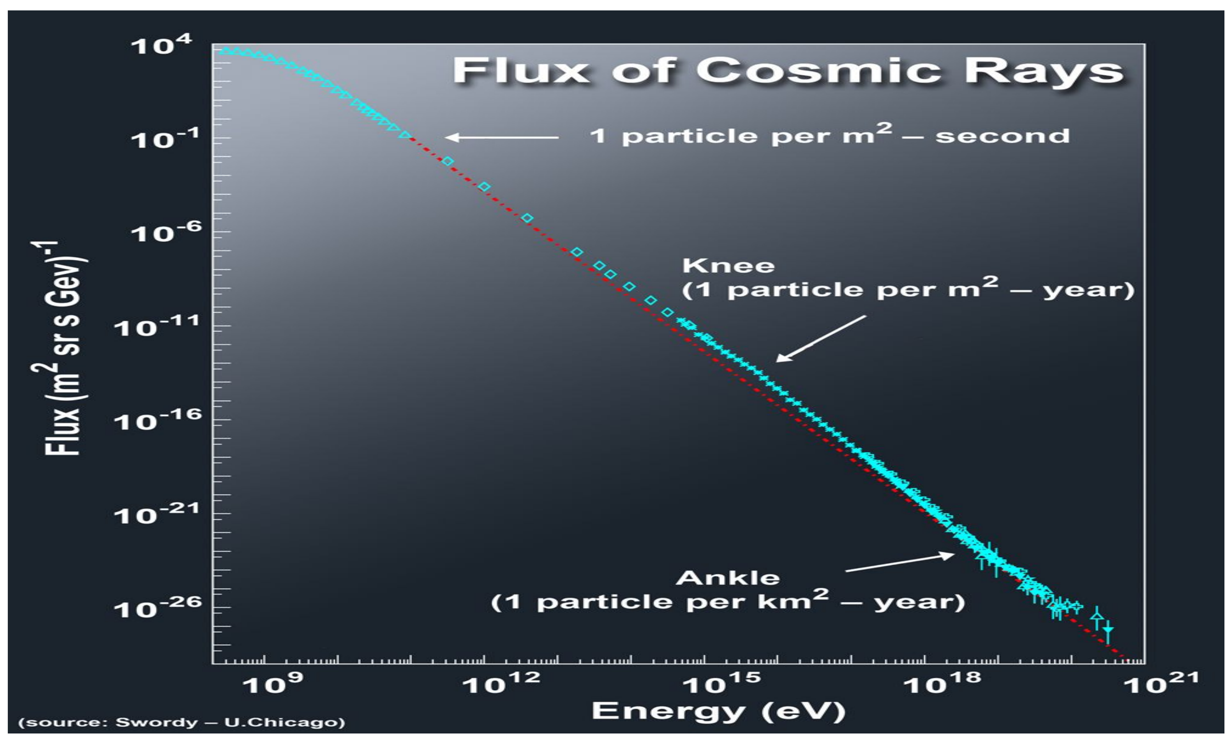
MESHCHERYAKOV LABORATORY OF INFORMATION TECHNOLOGIES

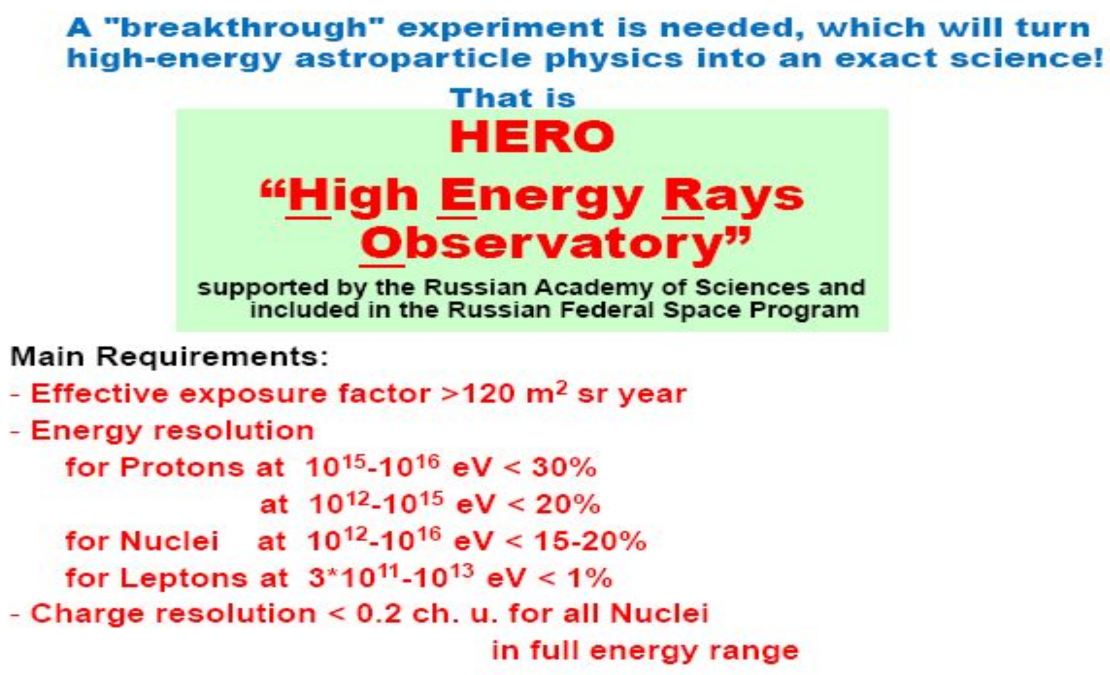
Monte Carlo background simulation in a boron loaded scintillator for OLVE-HERO detector

I. Satyshev[1, 2], L. G. Tkachev[1, 3]

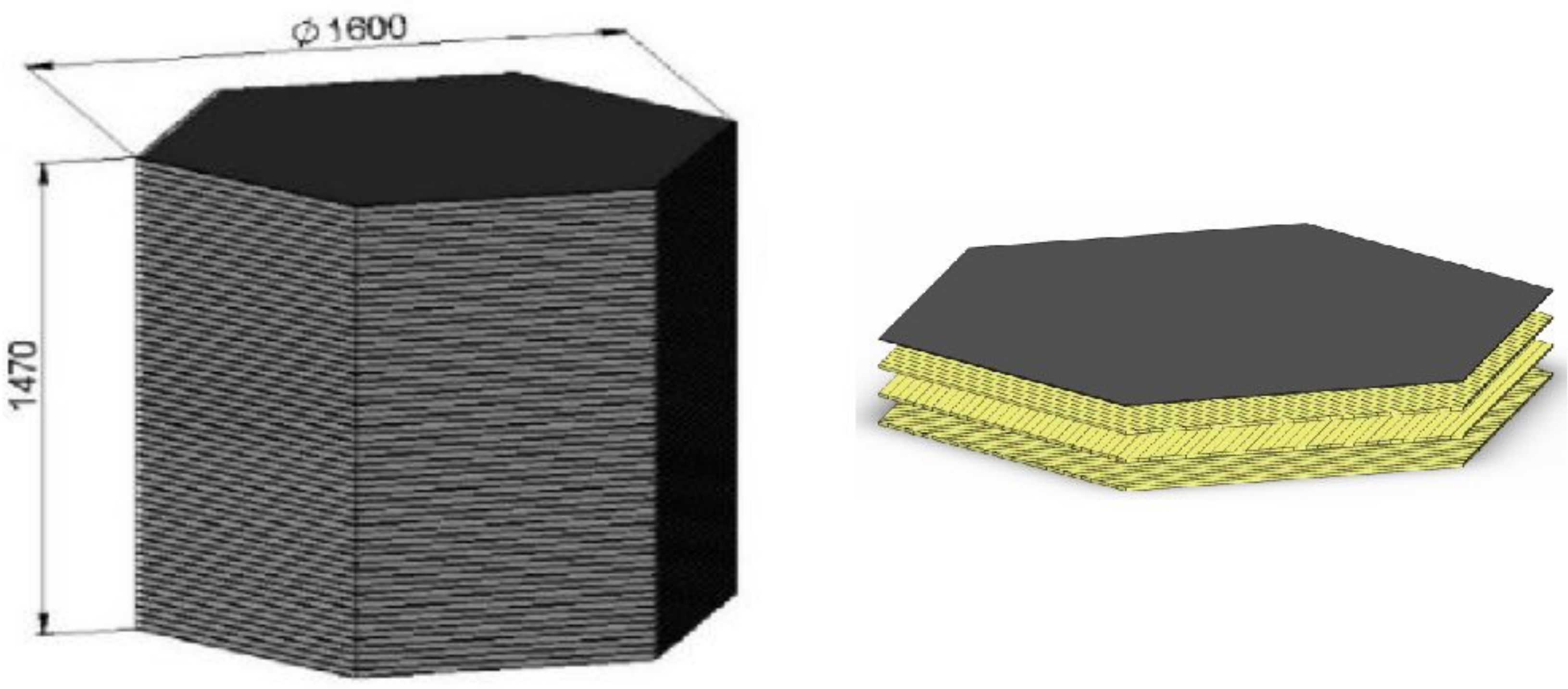
[1]Joint Institute for Nuclear Research, Dubna, Moscow oblast, Russia
[2]The Institute of Nuclear Physics, Ministry of Energy of the Republic of Kazakhstan, Almaty, Kazakhstan
[3]Dubna State University, Dubna, Moscow oblast, Russia
satyshevi@gmail.com; +7(926)721-63-81



CR spectrum



- on Earth orbit until 2030
- The main goal of the HERO mission is to get direct measurements of cosmic rays parameters in the **10^{12} –10^{16} eV** energy region
  - -Energy
  - -Direction arrival
  - -Type of the particle
- Geom-factor~ 16 m^2sr
- Scintillator + ^{10}B



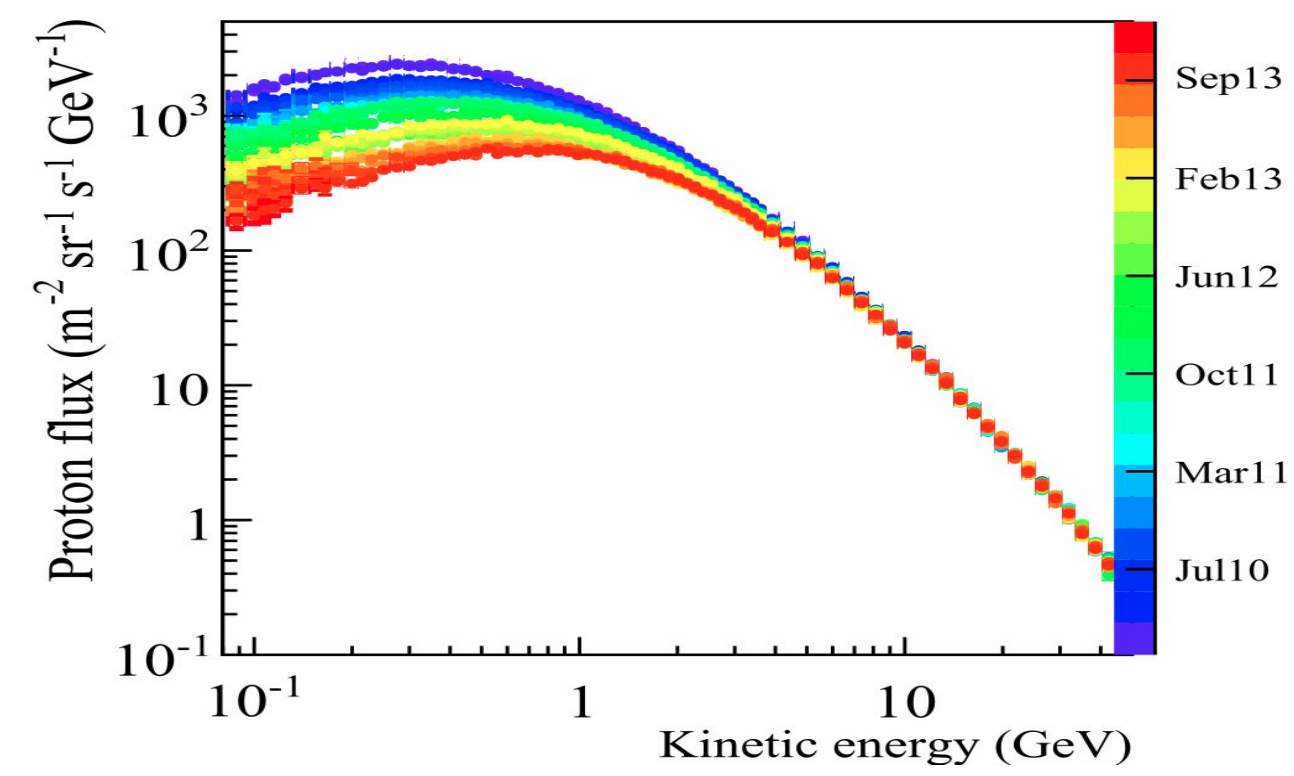
The scheme of HERO detector

Why do we need a boron loaded scintillator?

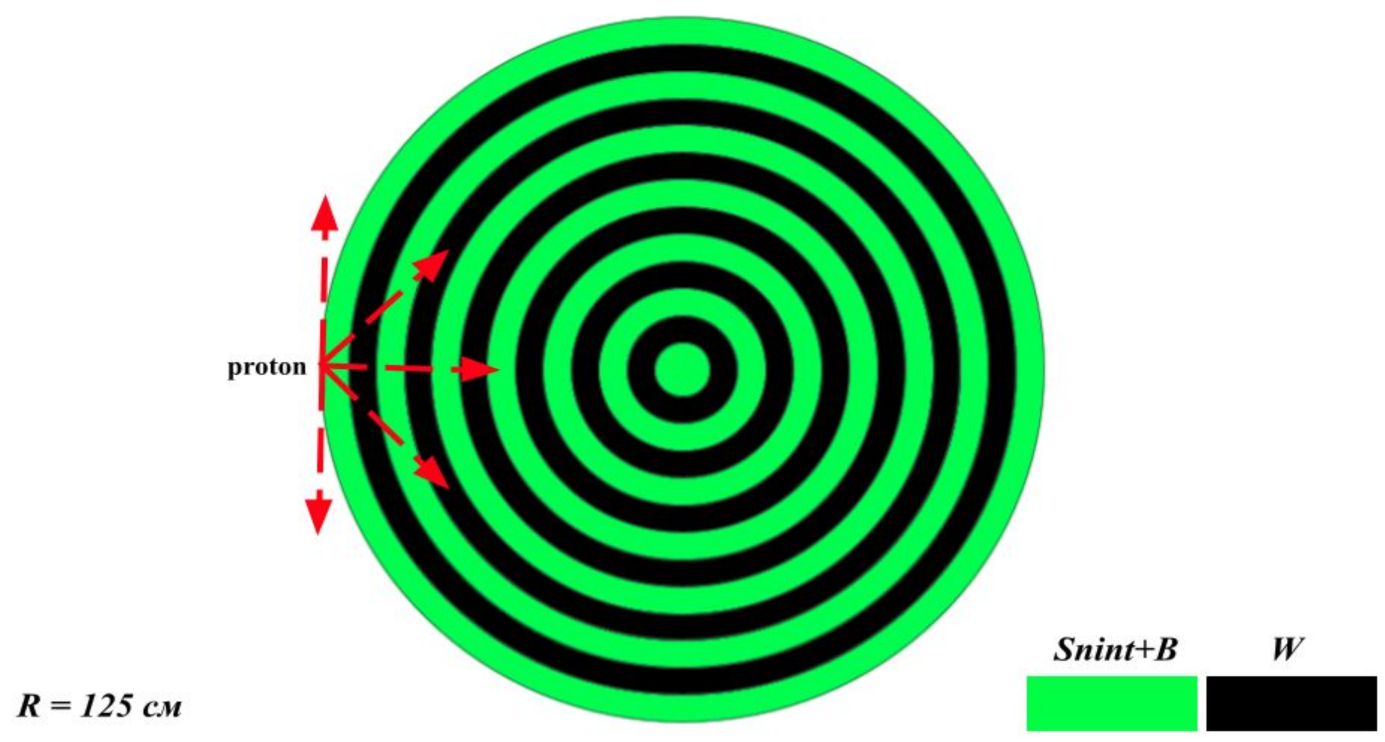
- hadrons number is GCRs is 10 000 times greater than electromagnetic particles.
- hadrons produce a larger number of neutrons by interacting with matter
- n + B^{10} -> α + Li^7 . α takes almost all the energy
- It will improve the rejection power between electromagnetic and hadron components of CRs

Monte-Carlo

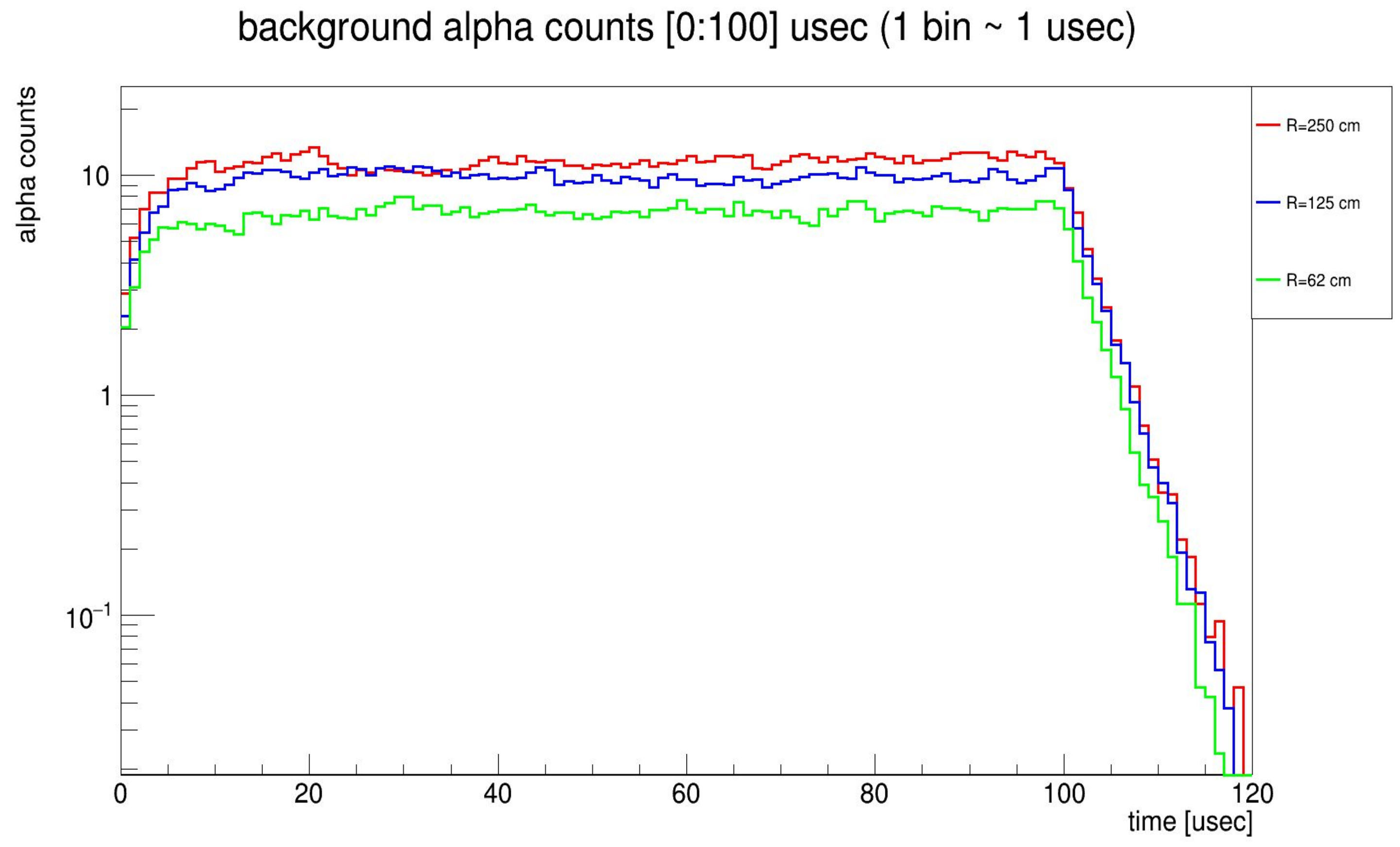
- to study background alpha counts level from cosmic protons in a boron loaded scintillator
- to estimate energy thresholds for different primary particles



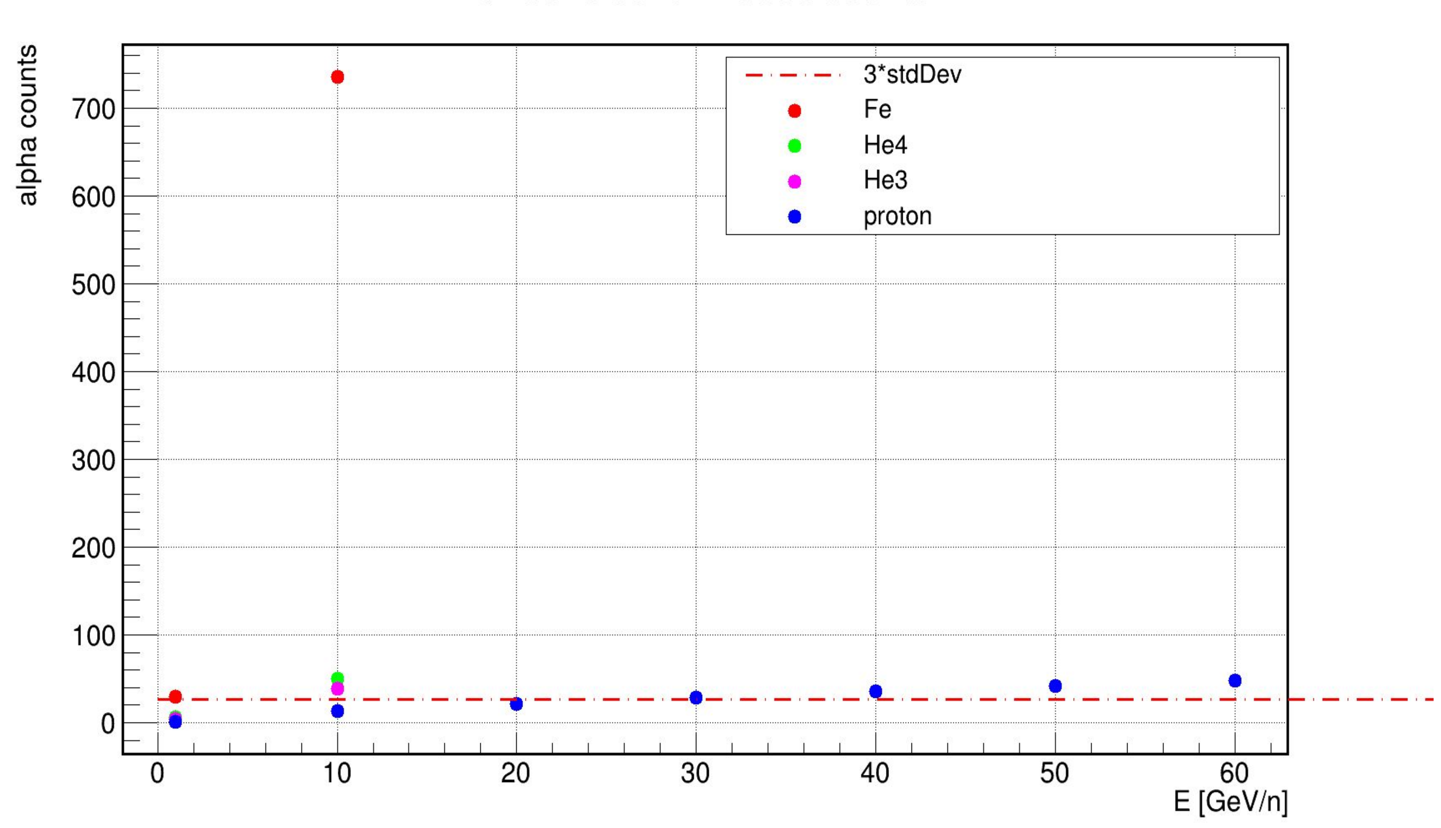
Spectrum of cosmic protons. PAMELA experiment



Monte-Carlo model



Monte-Carlo background alpha counts for diff. sizes of the detector



Monte-Carlo thresholds for diff. particles

The calculations were performed on the INP cloud segment, which is included in the distributed information and computing environment of JINR