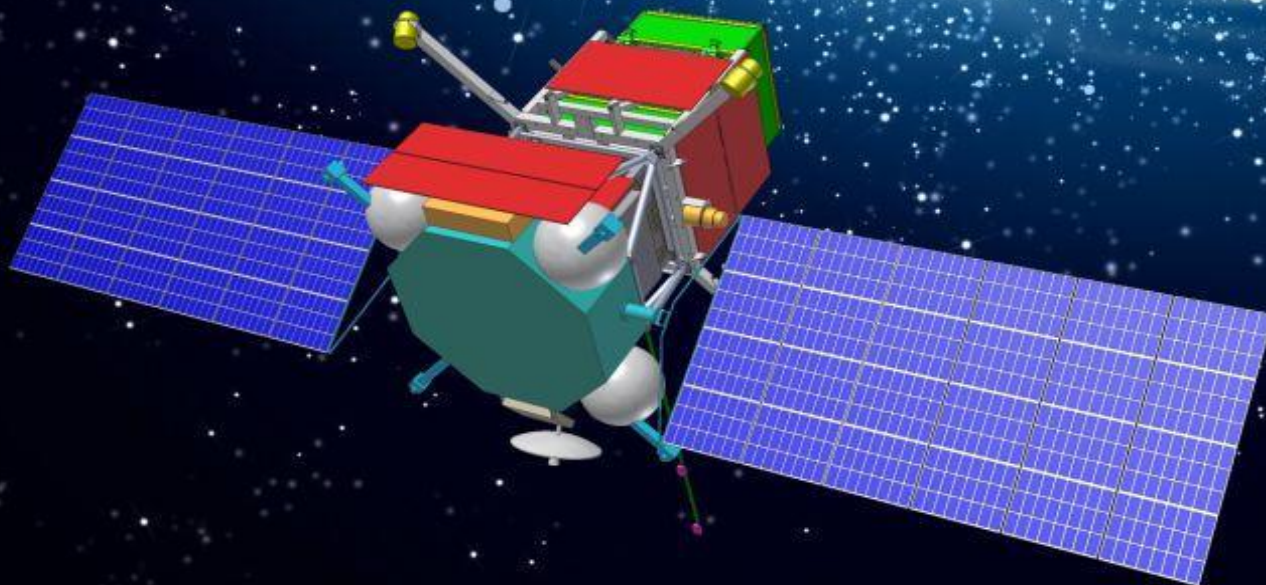


Aleksei Leonov
for the GAMMA-400 Collaboration

The performance of currently developing space-based
gamma-ray telescope GAMMA-400





ROSCOSMOS

The GAMMA-400 project is supported mainly
by the Russian State Space Corporation ROSCOSMOS
(contract no. 024-5004/16/224)



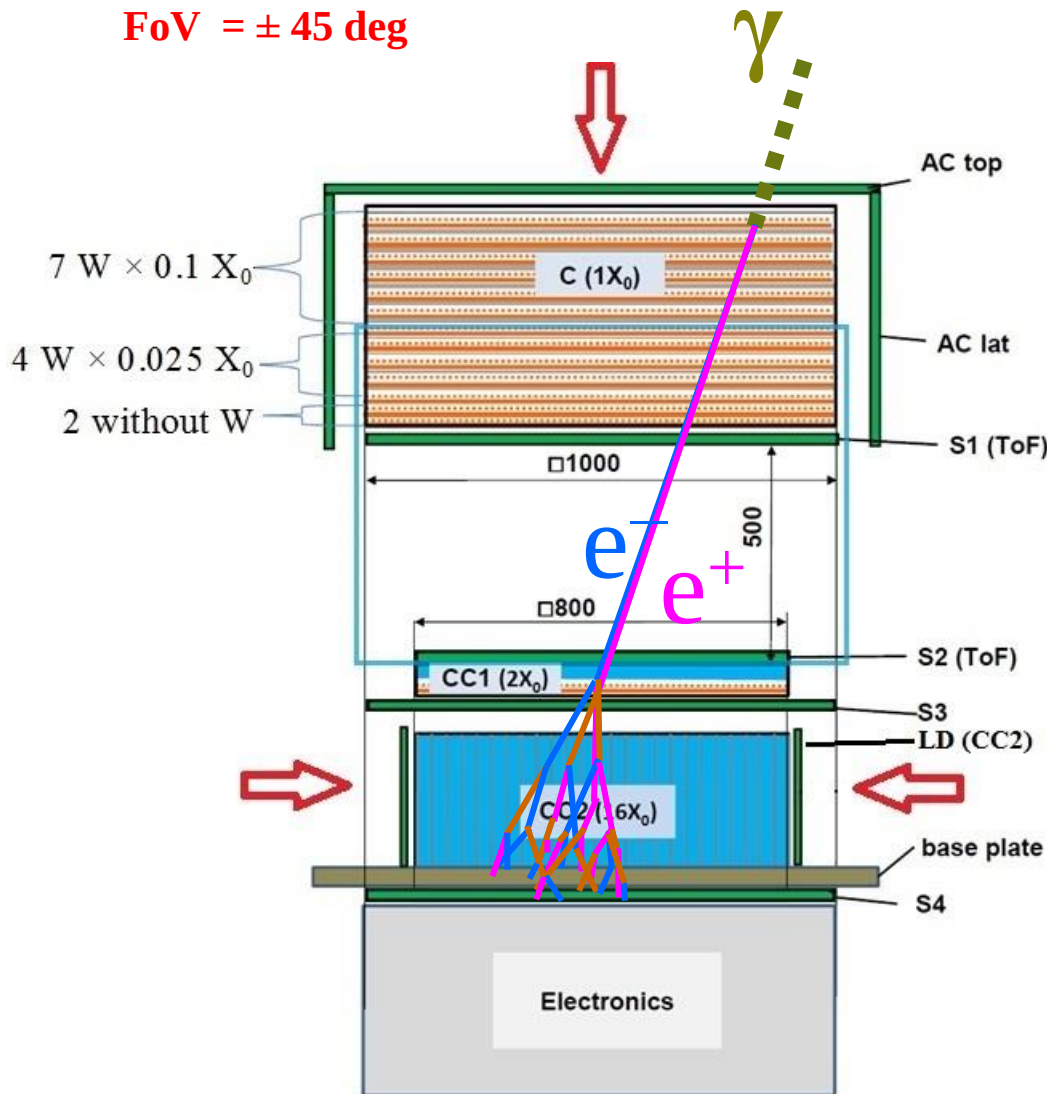
The work is partially supported
by the Ministry of Science and Higher Education of the Russian Federation
under Project “Fundamental problems of cosmic rays and dark matter”,
no. 0723-2020-0040

Technical details and scientific goals for GAMMA-400 project are
presented
in oral E1.16-0080-21

Gamma- and Cosmic-Ray Observations with GAMMA-400 Gamma-Ray Telescope

The GAMMA-400 physical scheme

FoV = ± 45 deg



AC – antineutrino system

C - converter-tracker $\sim 1 X_0$

S1, S2 – TOF detectors

CC1, CC2 – calorimeter

vertical thickness

$\sim 2+16=18 X_0$

CC2 – lateral thickness

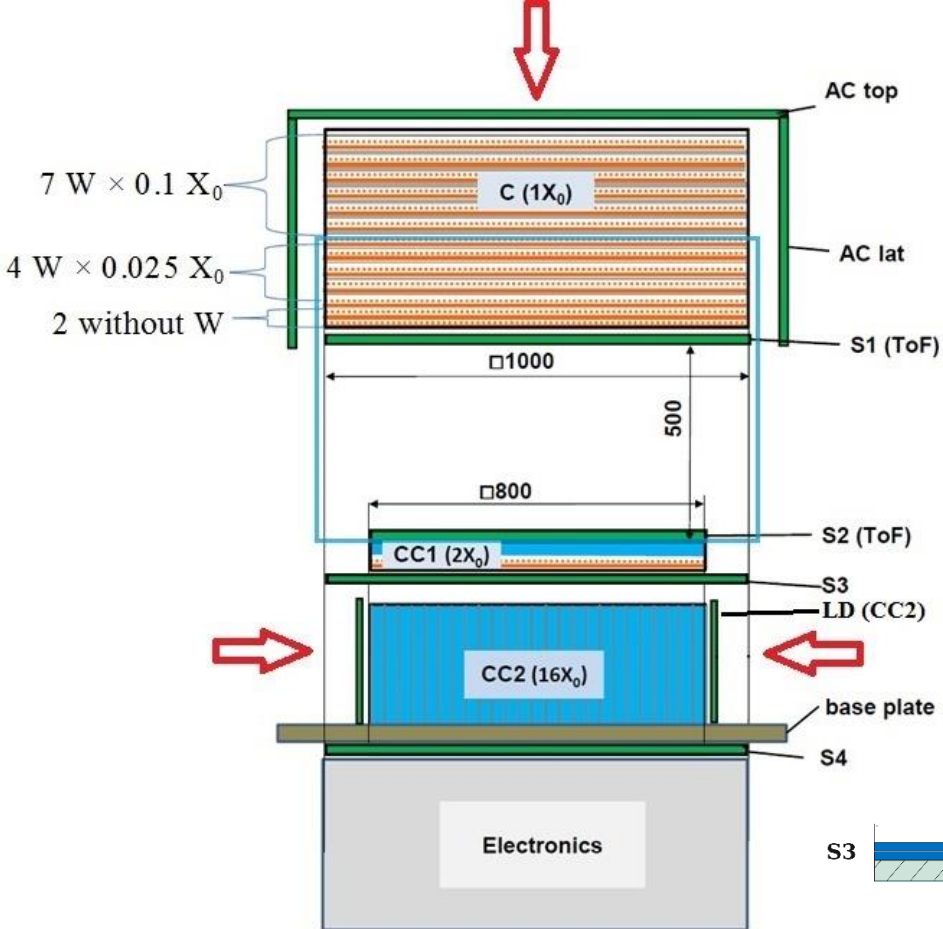
$\sim 43 X_0$

S3, S4 – scintillator detectors

$E = \sim 20 \text{ MeV} - \sim 1 \text{ TeV}$

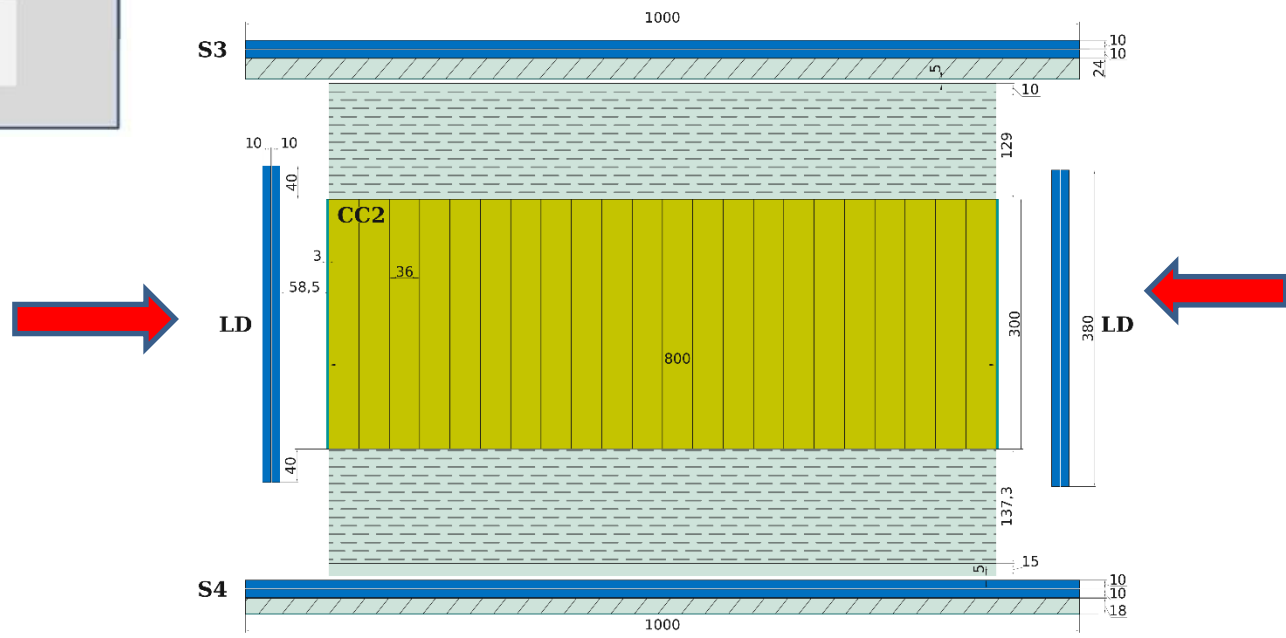
$\Delta\theta = \sim 0.01^\circ (E_\gamma = 100 \text{ GeV})$

$\Delta E/E = \sim 2\% (E_\gamma = 100 \text{ GeV})$

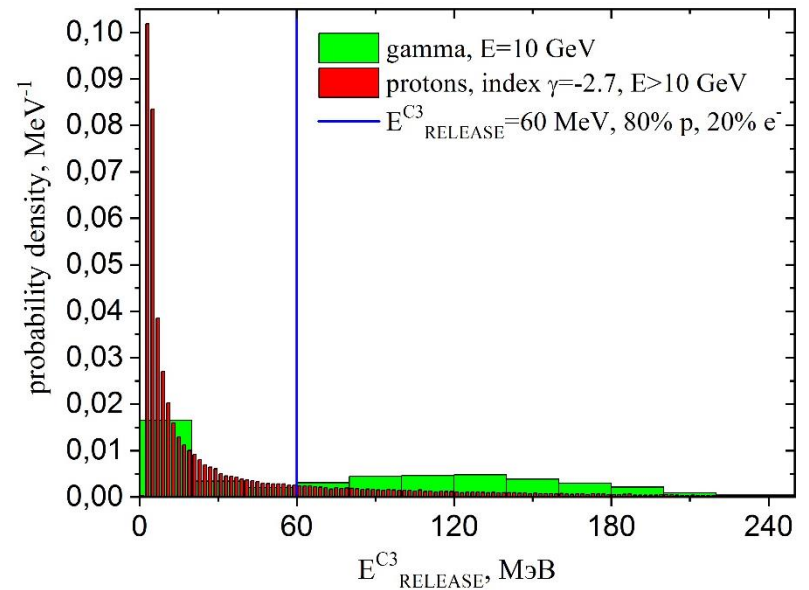
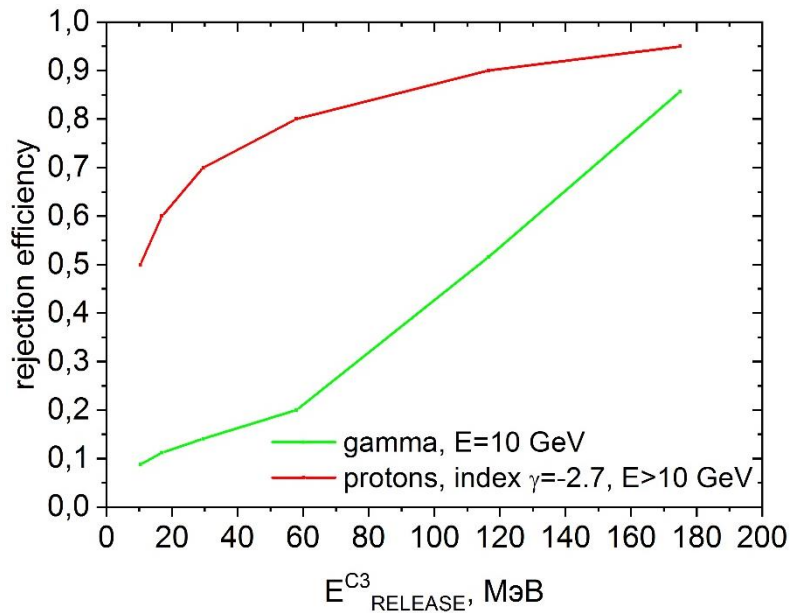
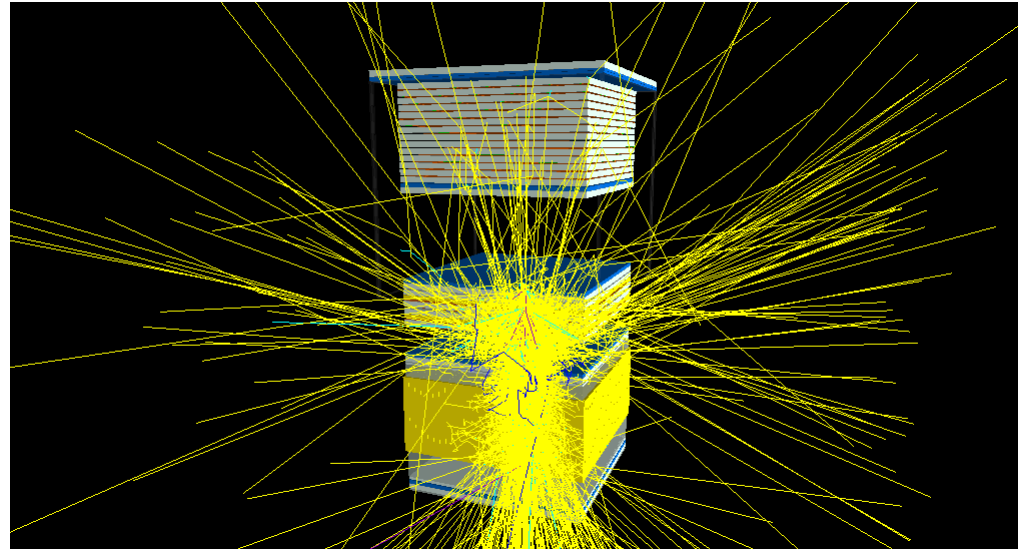
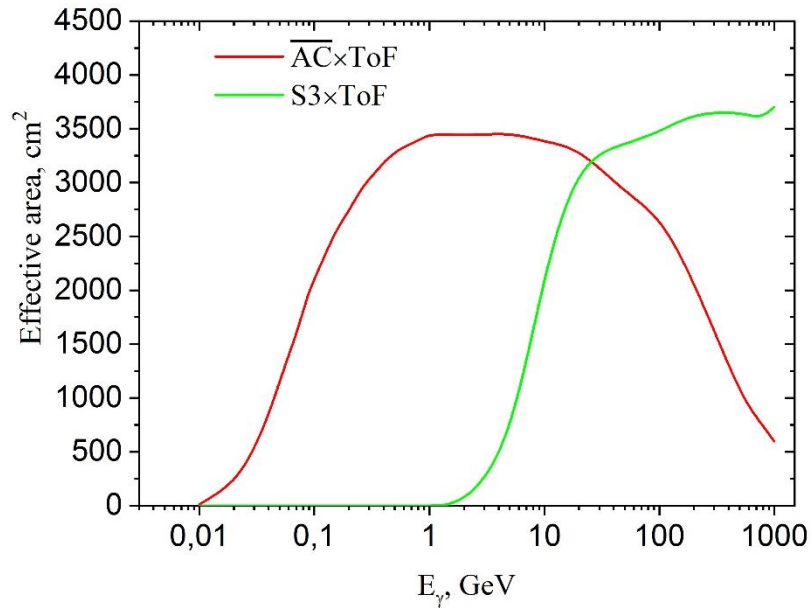


Main aperture:
 $(\overline{AC} \times ToF)(S3[E_{RELEASE} > E_{THRESHOLD}] \times ToF)$

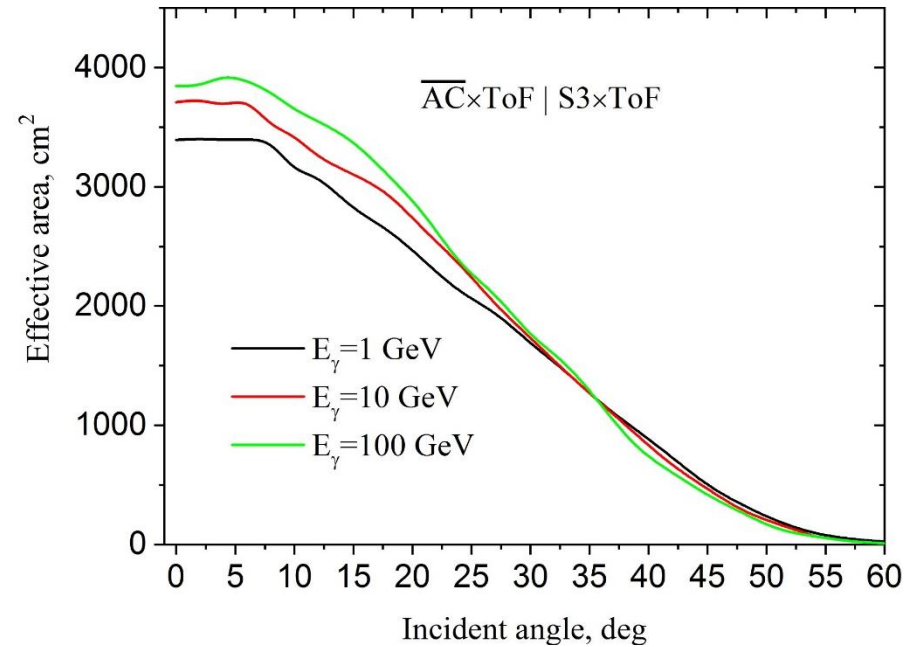
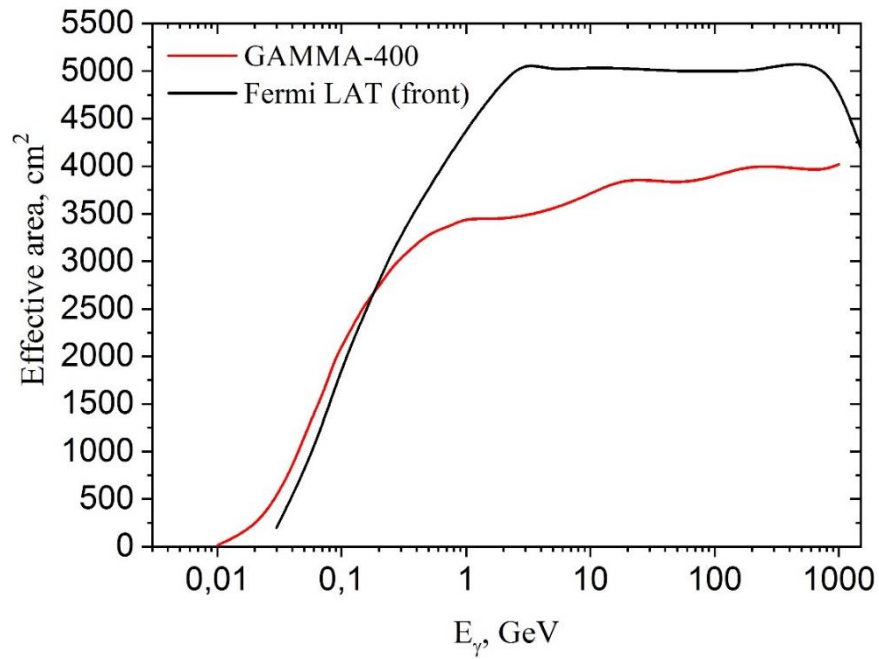
Lateral aperture:
 $\overline{LD} \times \overline{S_3} \times \overline{S_4} \times CC_2$

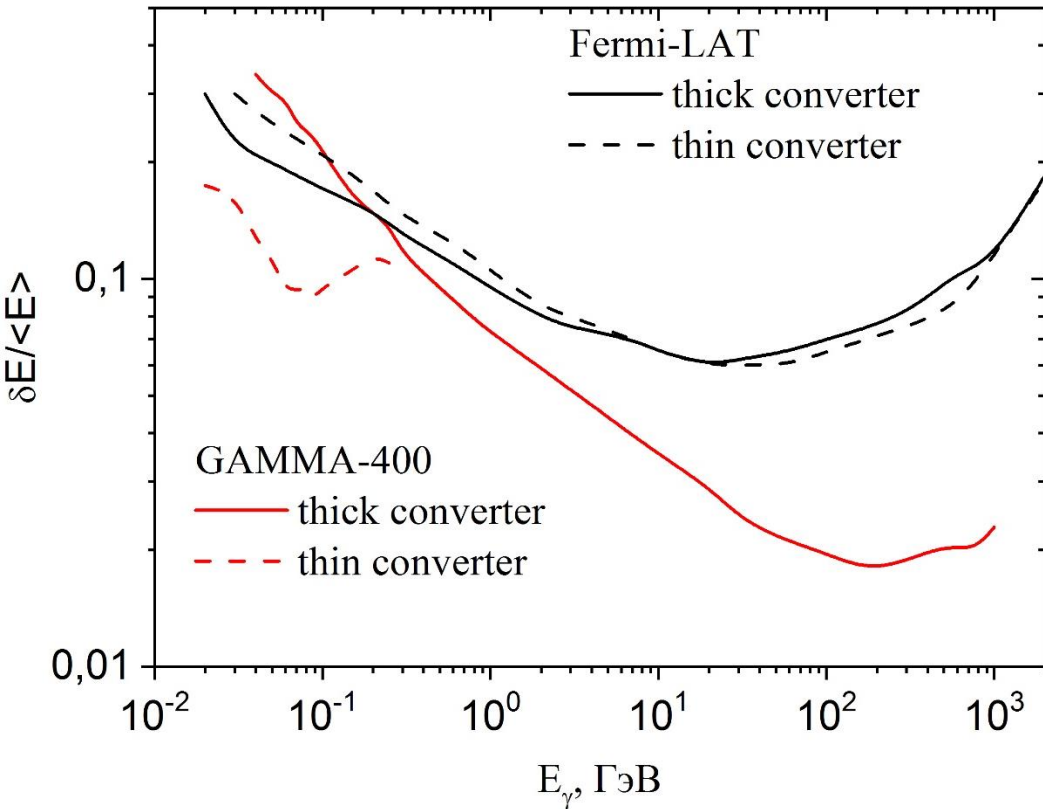


Main aperture: trigger construction



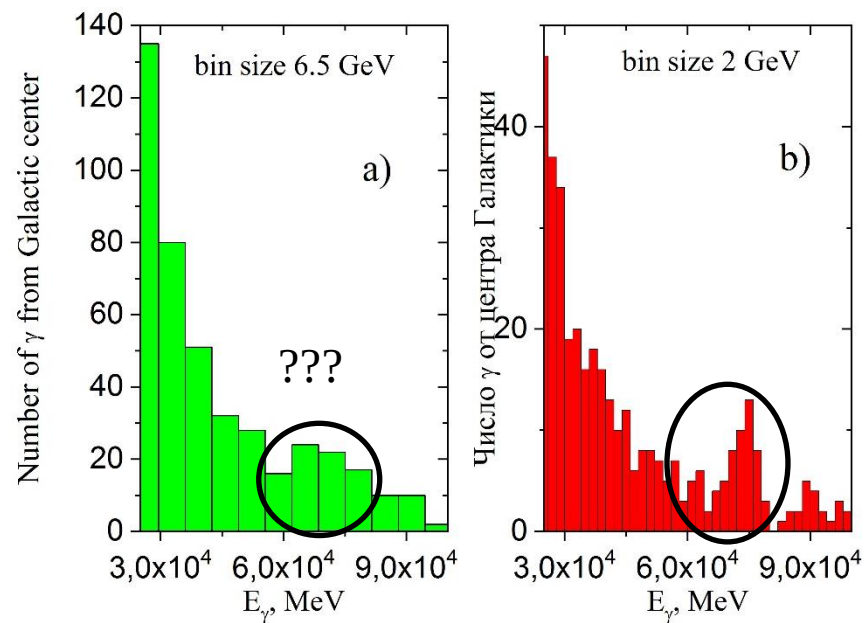
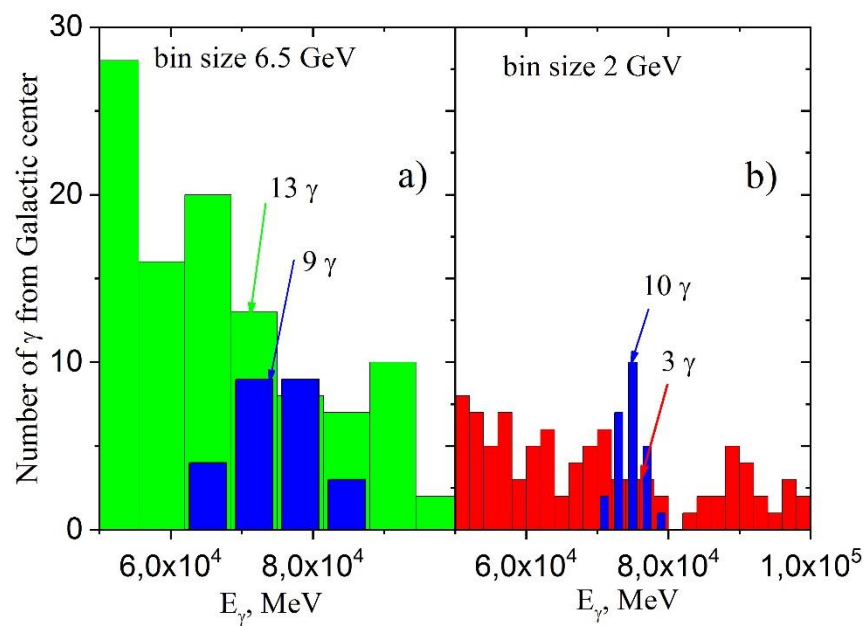
Main aperture: $(\overline{AC} \times ToF)|(S3 \times ToF)$



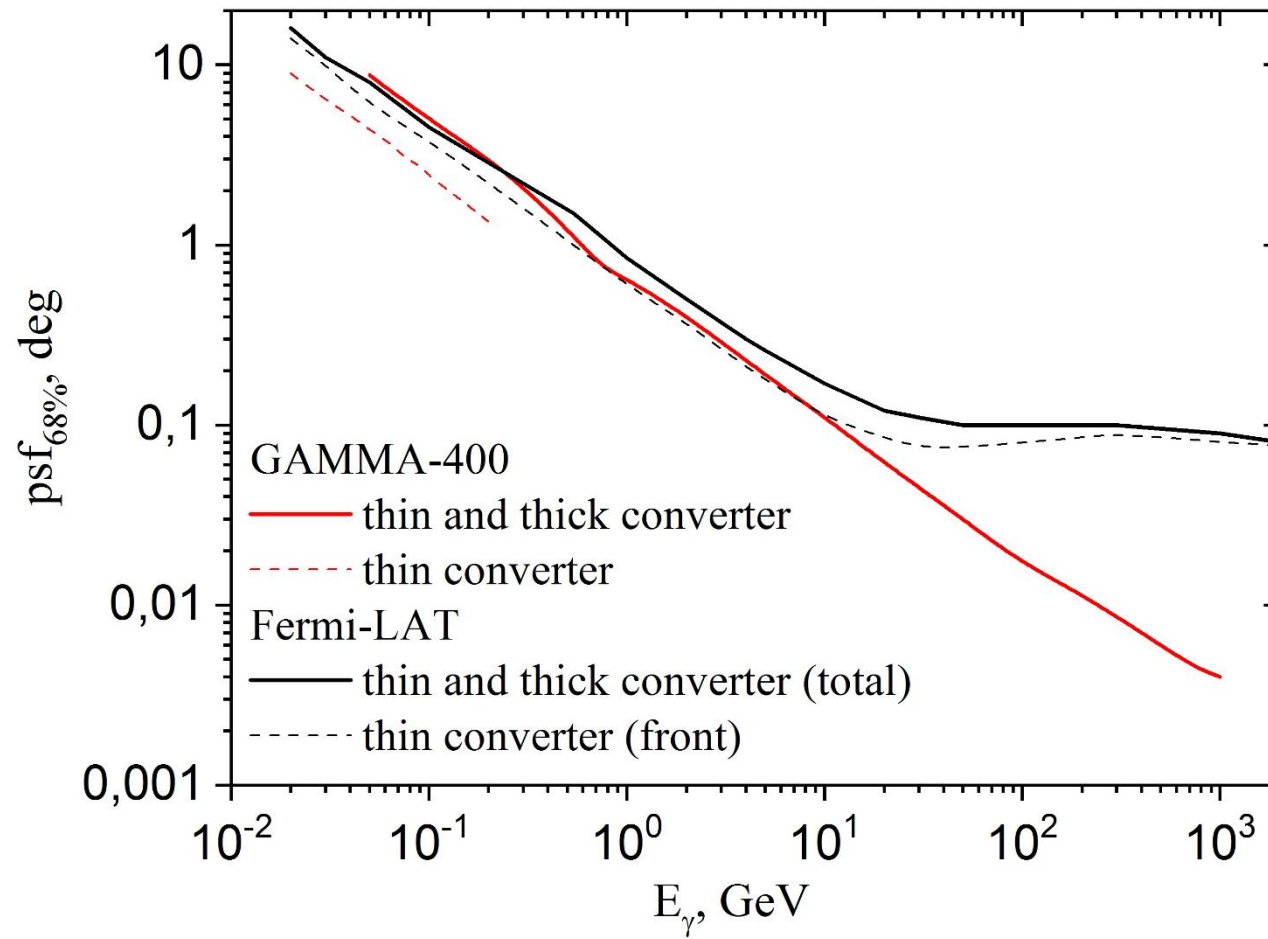


Energy resolution
(main aperture)

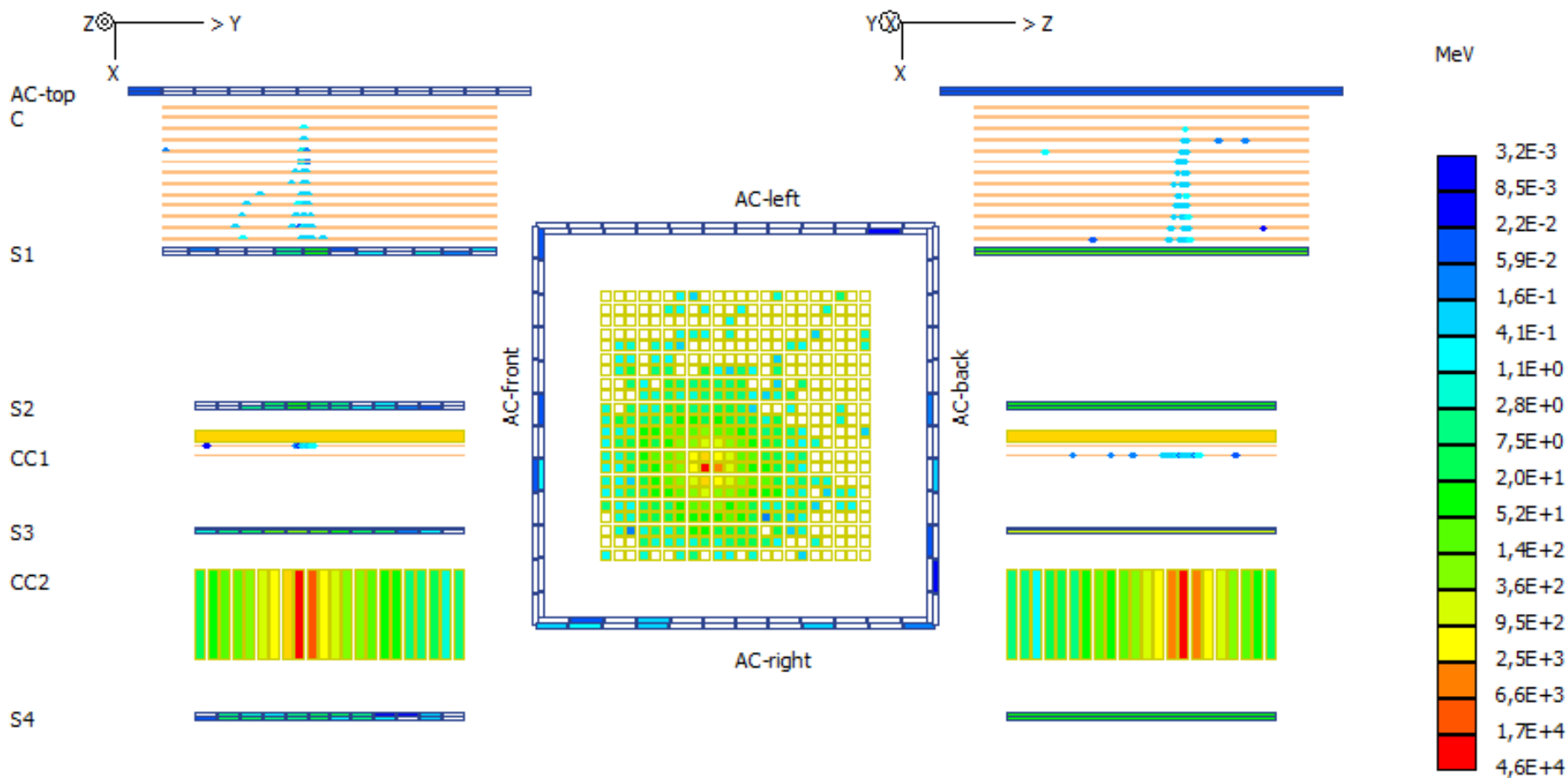
Line 75 GeV
25 gamma per year
from Galactic center



Angular resolution (main aperture)

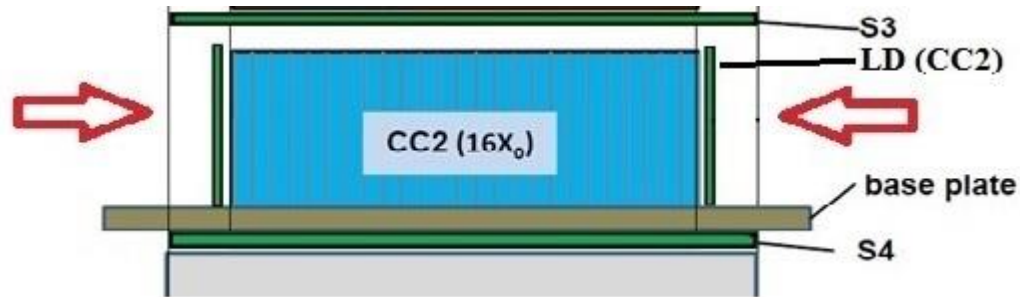


Simulation of recording 50-GeV gamma-quantum

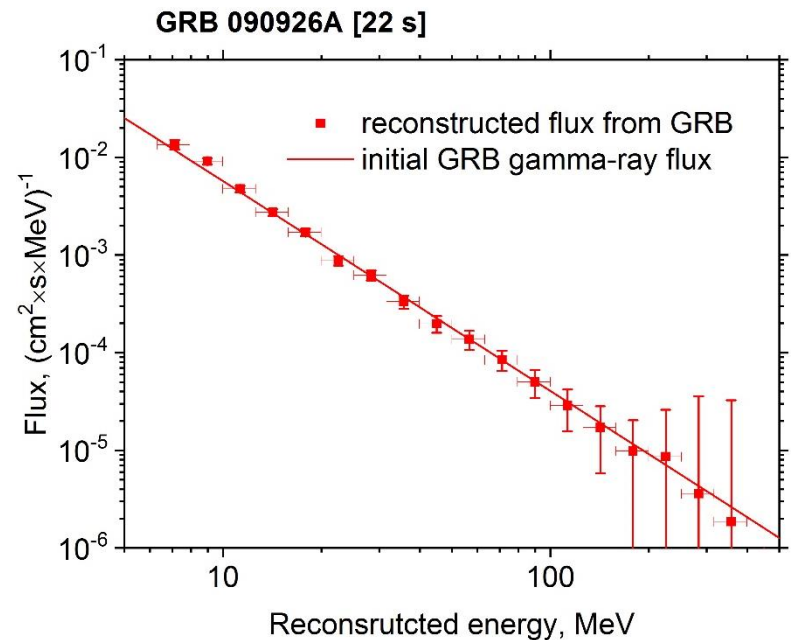
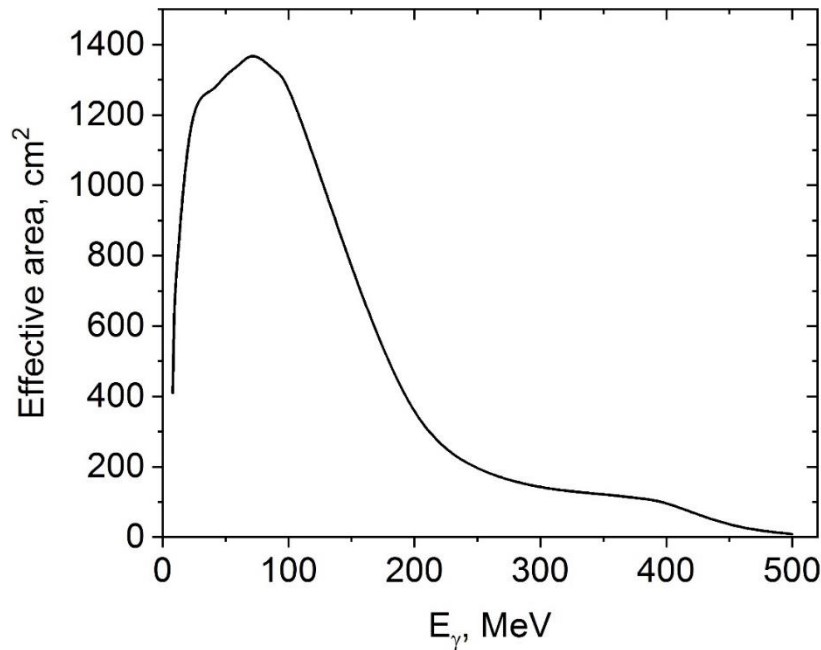


Event 20 Full Energy deposition 45570,0977 MeV

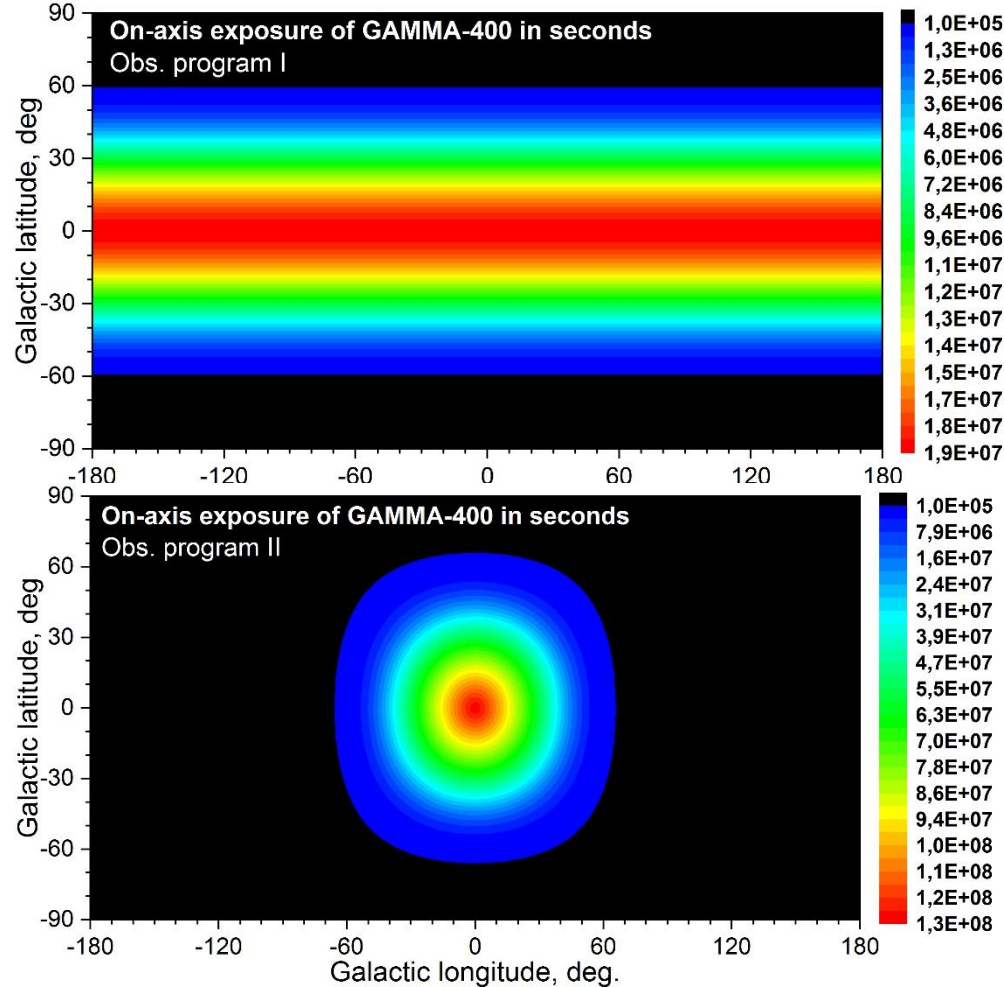
Lateral aperture: $\overline{LD} \times \overline{S}_3 \times \overline{S}_4 \times CC_2$



1. Second-level trigger logic is necessary to decrease significantly the count rate of cosmic ray particles.
2. This logic is based on differences in electromagnetic and hadronic cascades in calorimeter CC2.



The considered GAMMA-400 observational programs



Catalog	Energy interval $E_{\min} \div E_{\max}$	Number of sources with $N_{\gamma} > 30$	
		Observation program I	Observation program II
3FGL	100 MeV – 100 GeV	2331	848
3FGL	300 MeV – 100 GeV	2039	775
3FGL	1 GeV – 100 GeV	1293	642
3FGL	3 GeV – 100 GeV	432	425
3FHL	10 GeV – 2 TeV	83	106
3FHL	20 GeV – 2 TeV	34	46
3FHL	50 GeV – 2 TeV	8	18

- **After Fermi-LAT the GAMMA-400 gamma-ray telescope will represent a unique opportunity to significantly improve the direct data of HE gamma rays due to unprecedented angular and energy resolutions, large area, and continuous long-term observations.**

GAMMA-400 site - <http://gamma400.lebedev.ru/>

Thanks for your attention,
a good luck for GAMMA-400 project !!!

