Expected performance of the K-EUSO space-based observatory

Francesco Fenu*, S. Sharakin, M. Zotov, N. Sakaki, Y. Takizawa, M. Bianciotto, M. Bertaina, M. Casolino, P. Klimov
on behalf of the JEM-EUSO collaboration

* Speaker

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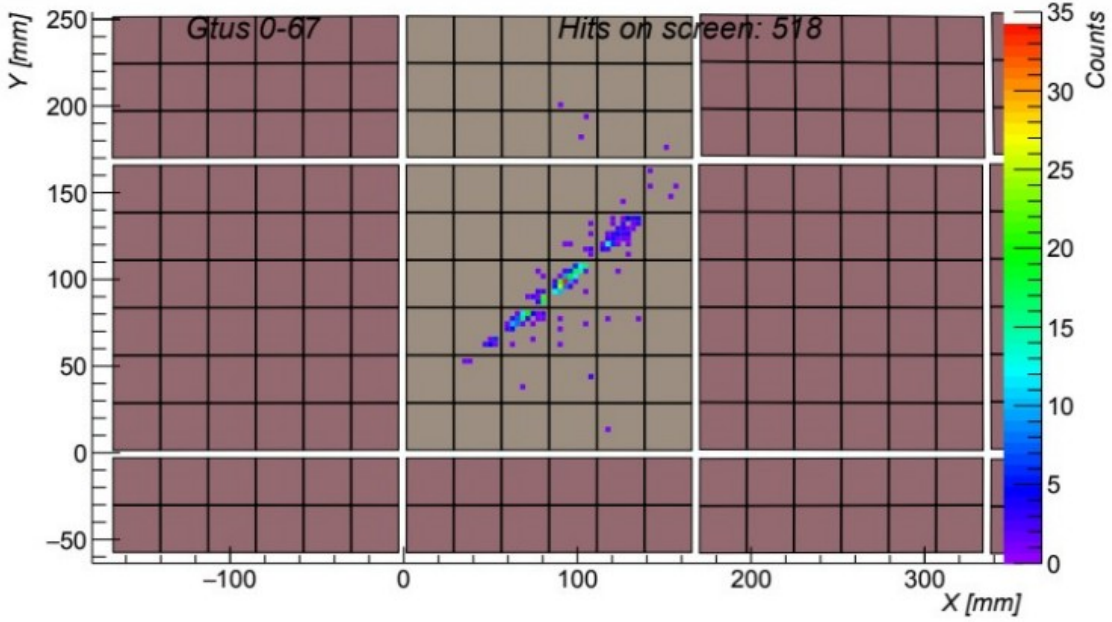
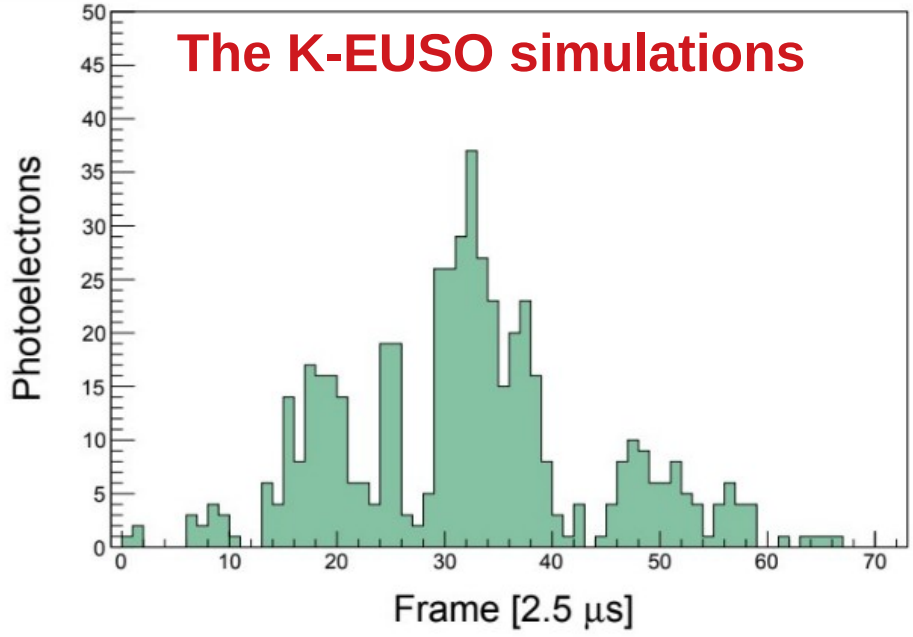
The K-EUSO simulations



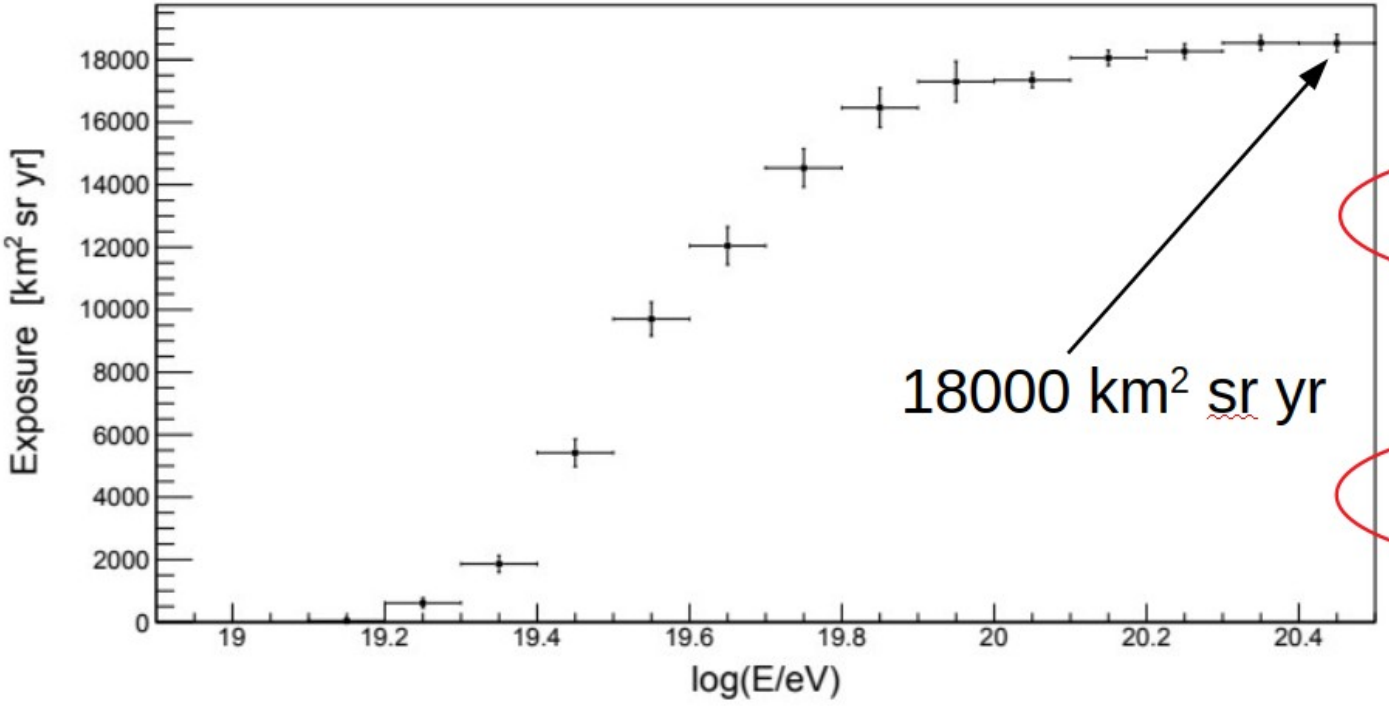


Simulations of EAS to test the expected performance of the K-EUSO observatory

ESAF simulation software

- 400 km orbit
- 90X130 km^2 FOV
- 1 pixel 0.1°~700 m on ground
- Hamamatsu R11265-103-M64
- 1.4X2.2 m^2 optics
- 1.3X1 m^2 FS

The exposure curve



Expected rates

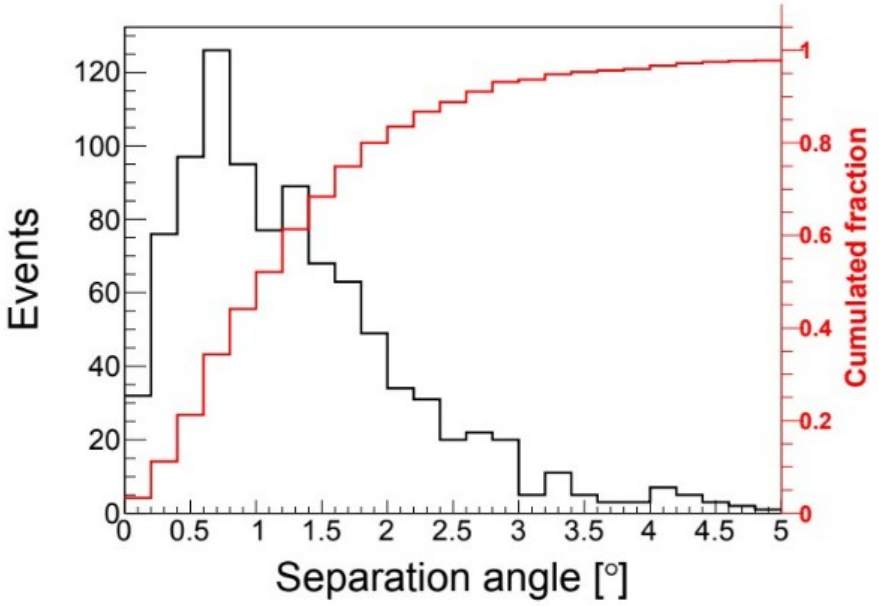
~65 events / year above $5X10^{19}$ eV

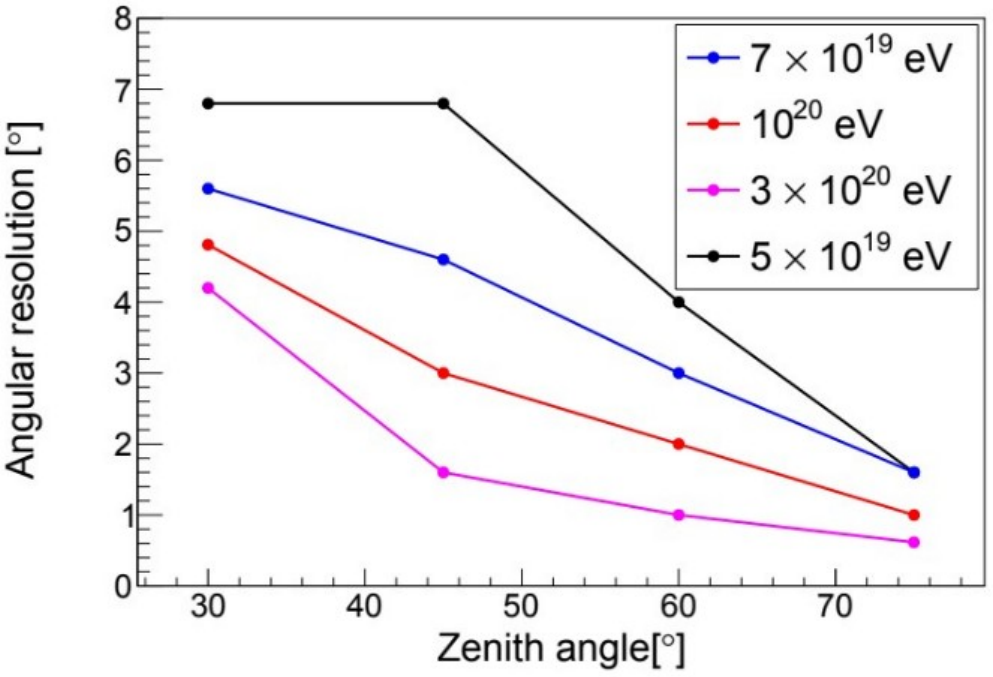
~4 events / year above 10^{20} eV

$$\mathscr{E}(E) = \frac{N_{\text{trigg}}}{N_{\text{simu}}}(E) \times A_{\text{simu}} \times \Omega \times \eta \times \eta_{\text{clouds}} \times \eta_{\text{city}} \times t.$$

A_{simu}=93600 km²
η=0.2, η_{city}=0.9
η_{cloud}=0.72, t=1yr

The angular reconstruction





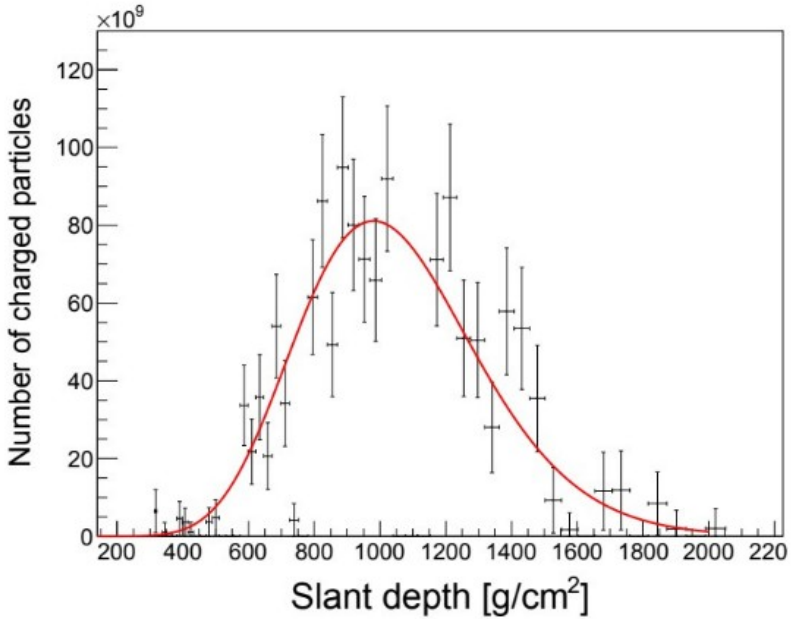
Reconstruction of the angle through fit on position and timing of the signal

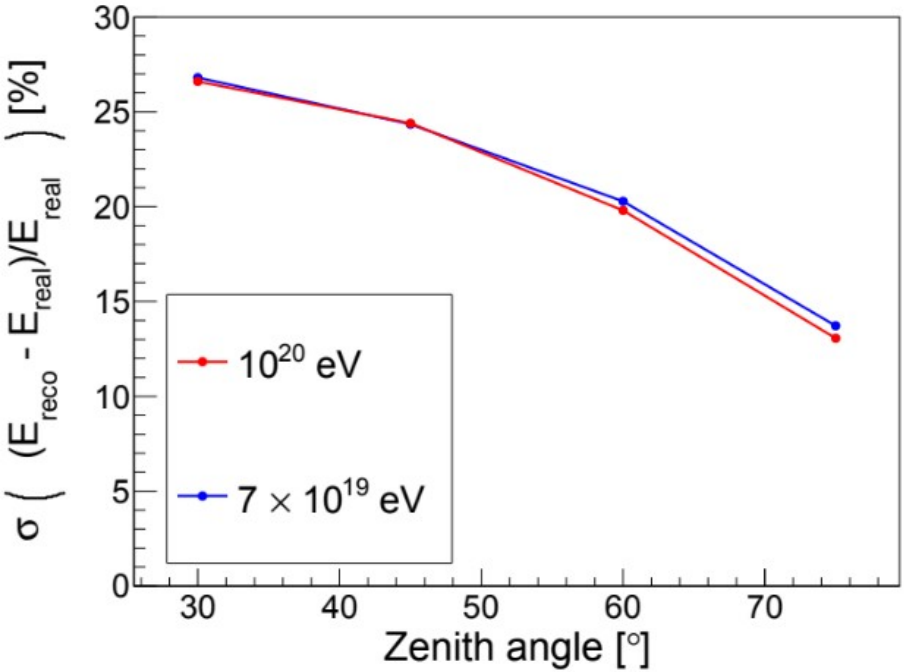
Comparison of timing and position of signal with test shower

Resolution: angle within which 68% of the events fall

4-7° (low zenith angle)
1-2° (high zenith angle)

The energy reconstruction





Reconstruction of the shower profile

Fit of the profile to obtain:

- Energy
- X_{max}

Calculate the standard deviation of the ratio

$$\left(E_{reco} - E_{real}\right) / E_{real}$$

~25% (low zenith angle)
~15% (high zenith angle)

Thanks a lot for your attention