GPU computing use case for H.E.S.S./CTA

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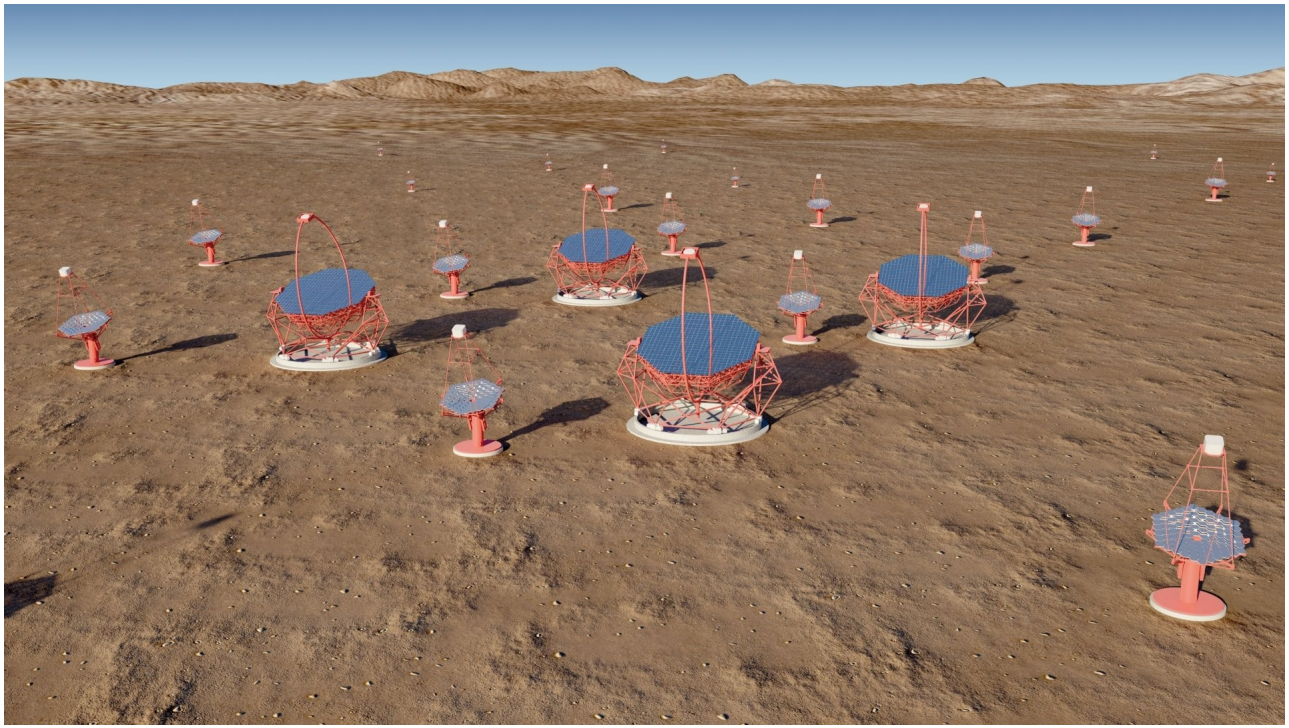
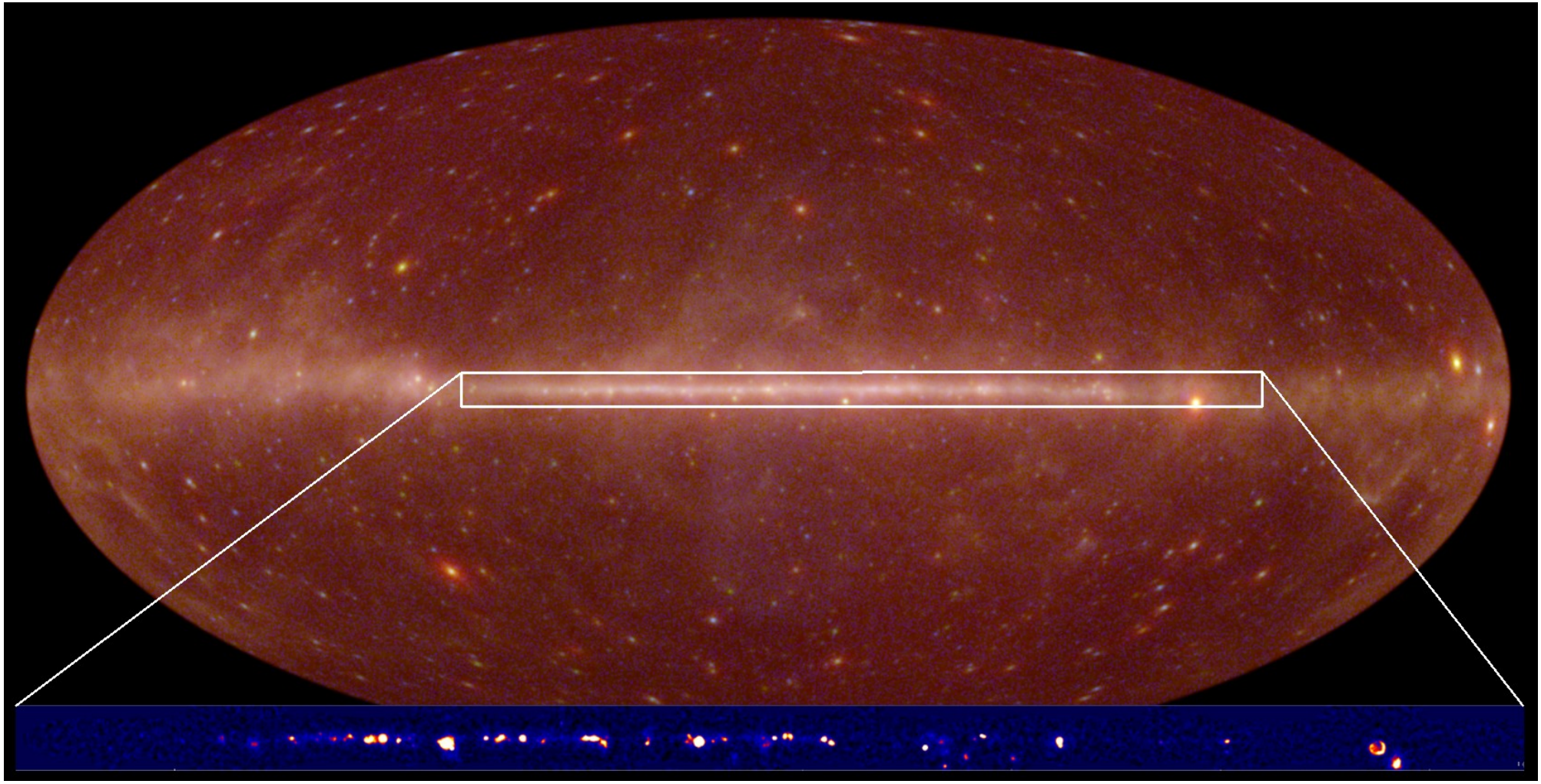
The present: H.E.S.S. (High Energy Stereoscopic System)

The future: CTA (Cherenkov Telescope Array)

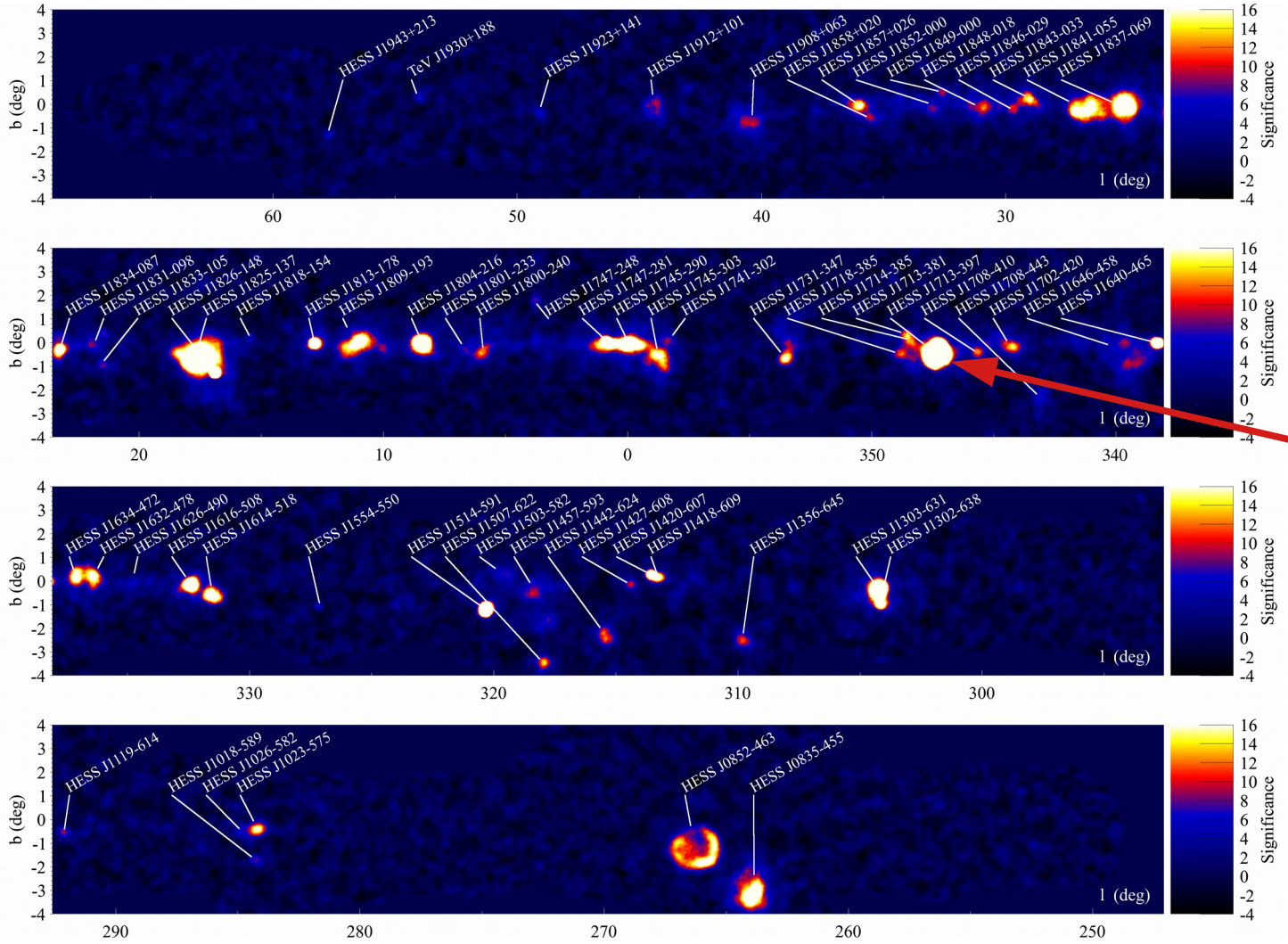


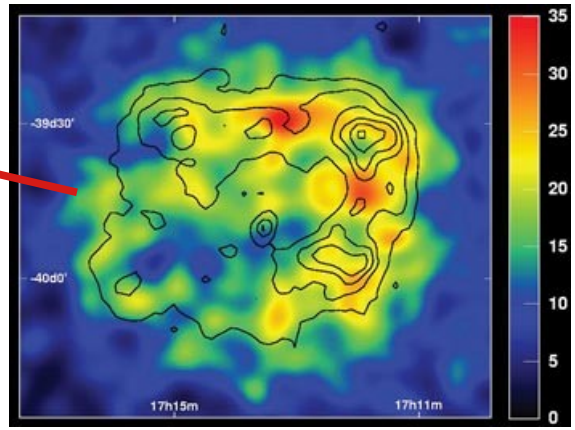
- Worldwide effort: >1200 members, 200 institutes, 32 countries and counting...
- 2 sites: one per hemisphere (ongoing discussions: La Palma (Spain), Paranal (Chile))
- 3 types of telescopes: SST, MST, LST
- Broad energy range: ~10 GeV – >100 TeV
- 10 x sensitivity wrt. current instruments, ~5 x angular resolution

Very high energy astrophysics

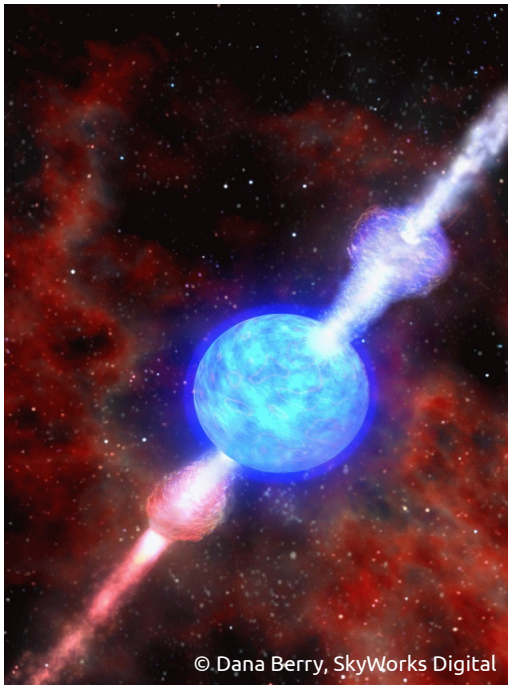


Very high energy astrophysics

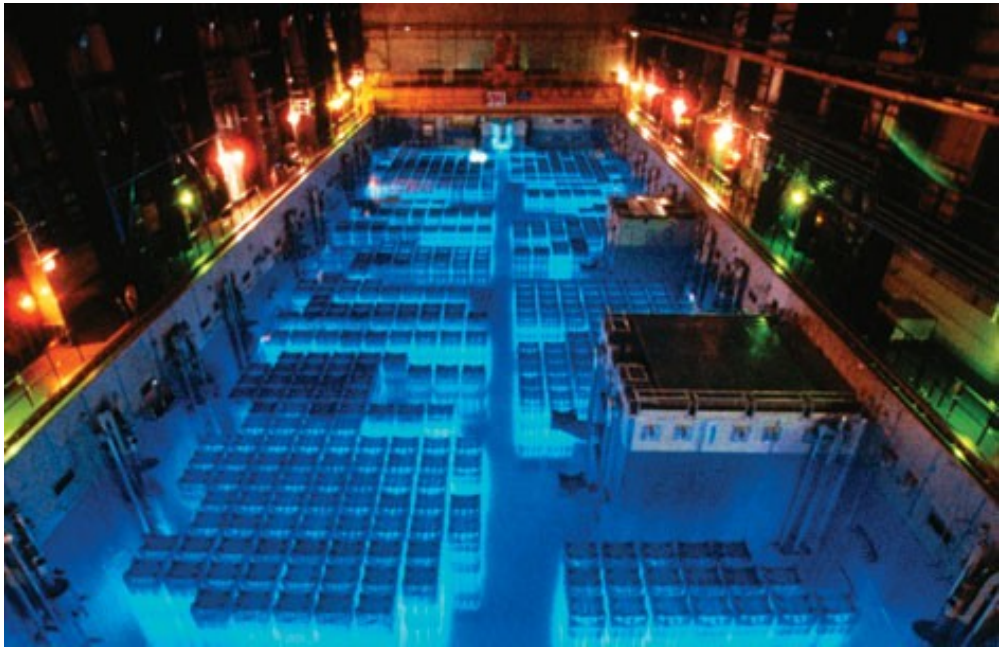


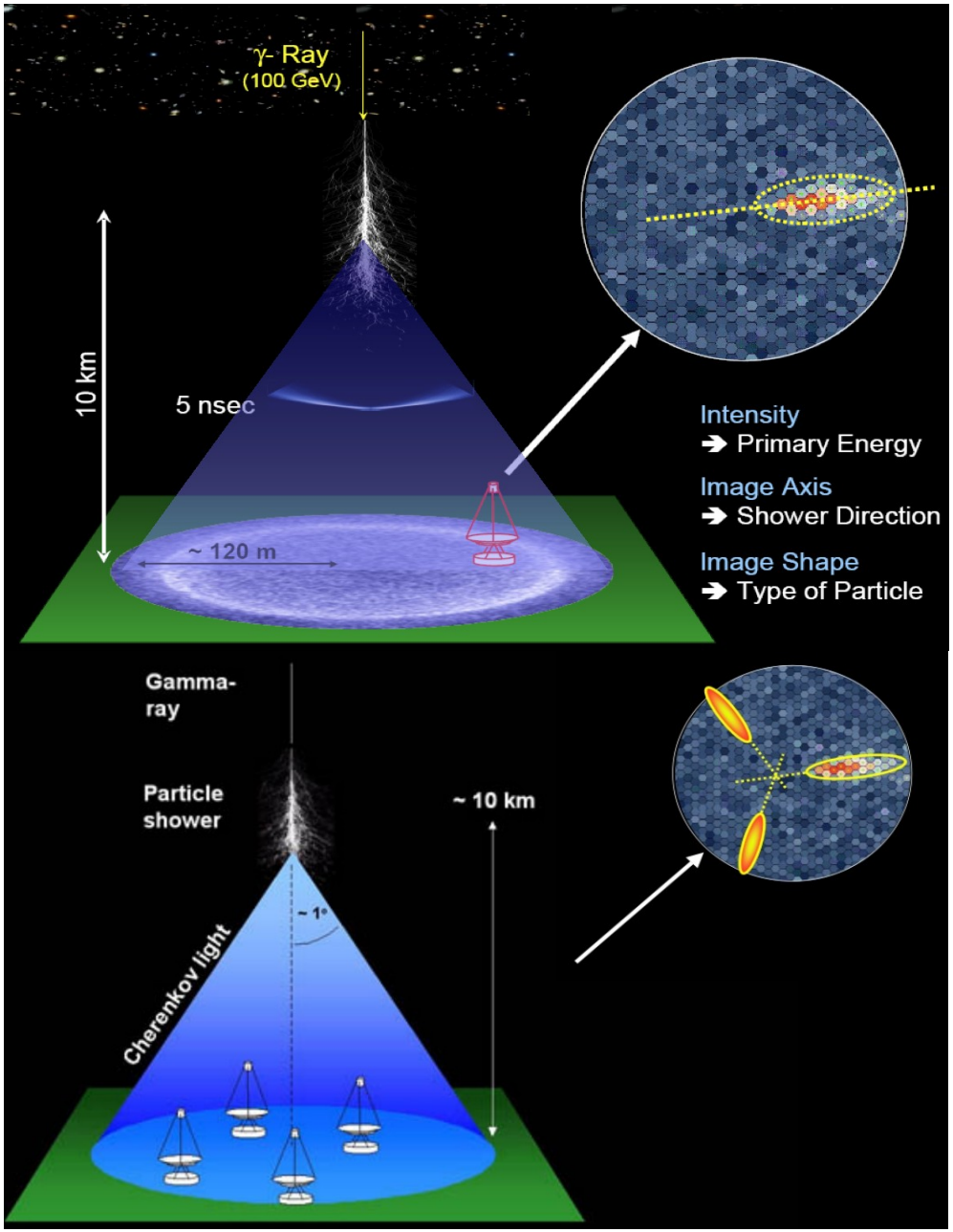


Very high energy astrophysics



Imaging Atmospheric Cherenkov Telescopes

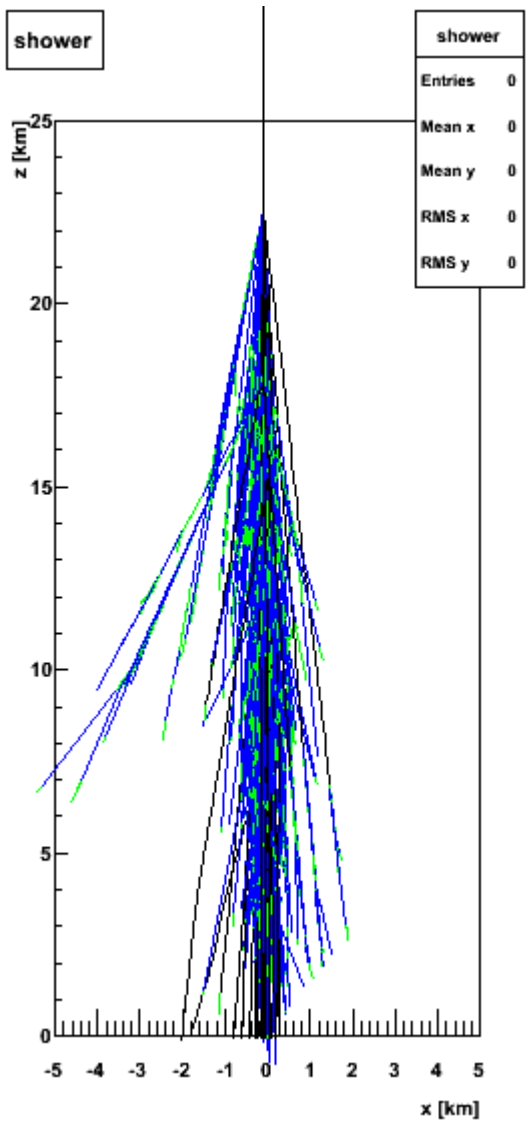




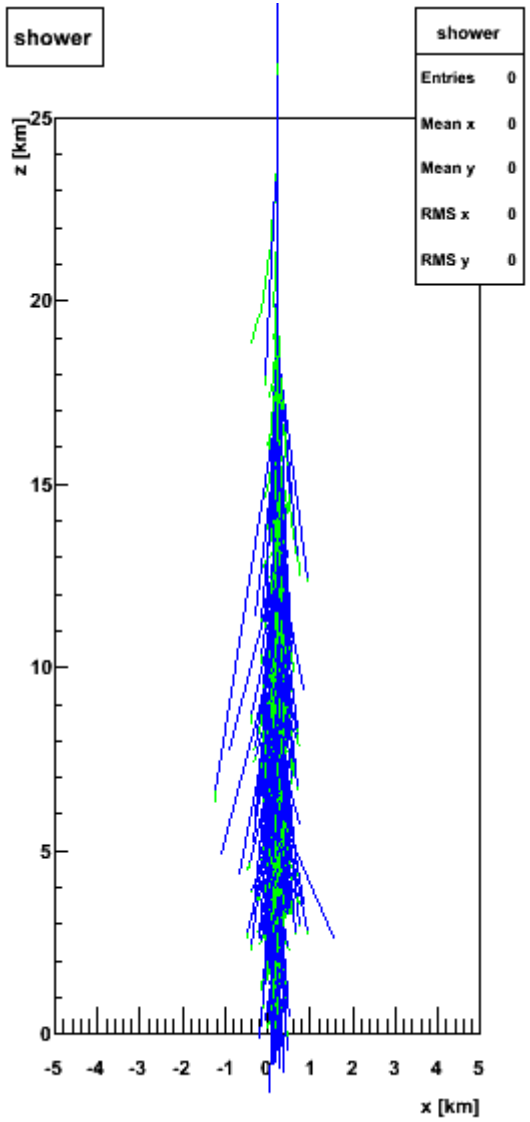
IACT data analysis

- Atmosphere **is part** of the detector → impossible to calibrate an IACT camera using a particle beam.
- ⇒ Energy scale calibration against extensive, massive MC simulations → EGI grid.
- Large background – mainly light cosmic ray nuclei (protons, helium) – over faint signal (γ-rays) to detect → event discrimination

Event discrimination



Proton 1 TeV



Gamma 1 TeV

Event discrimination

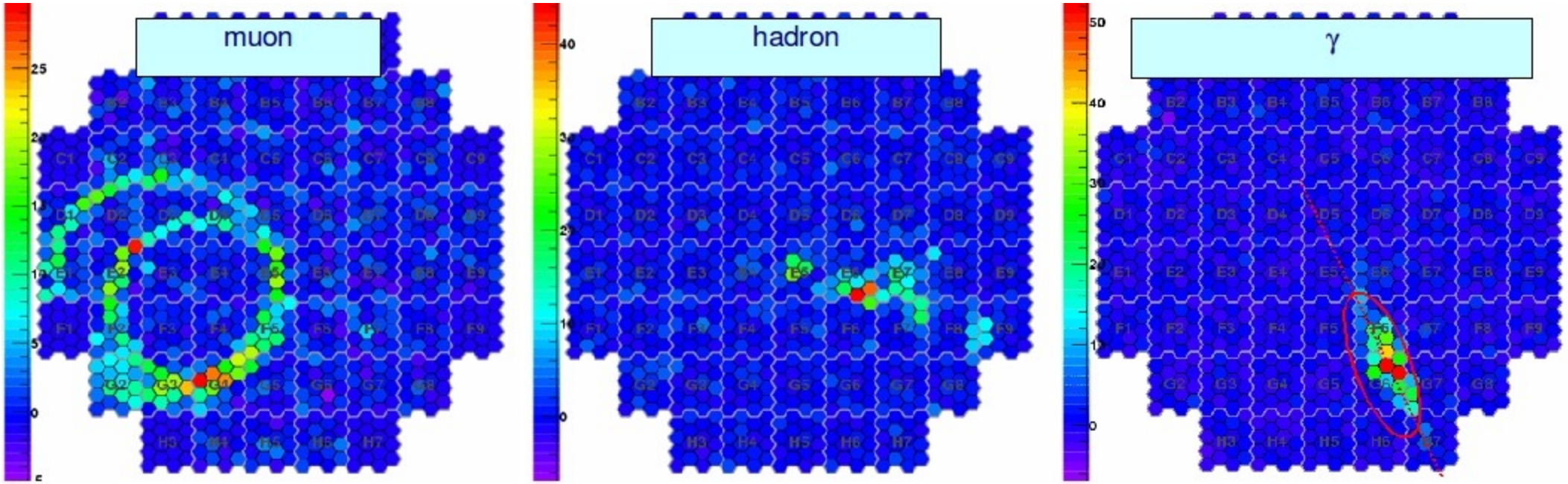


Image pattern recognition → here could lie the power of GPU computing !

Calibration: pixel per pixel → parallelizable