

# PeV Explorer 計画 R & D(3)



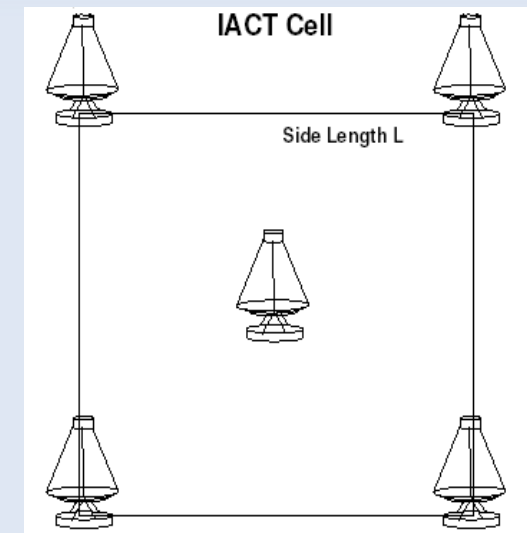
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2010年9月14日@日本物理学会秋季大会(九工大)

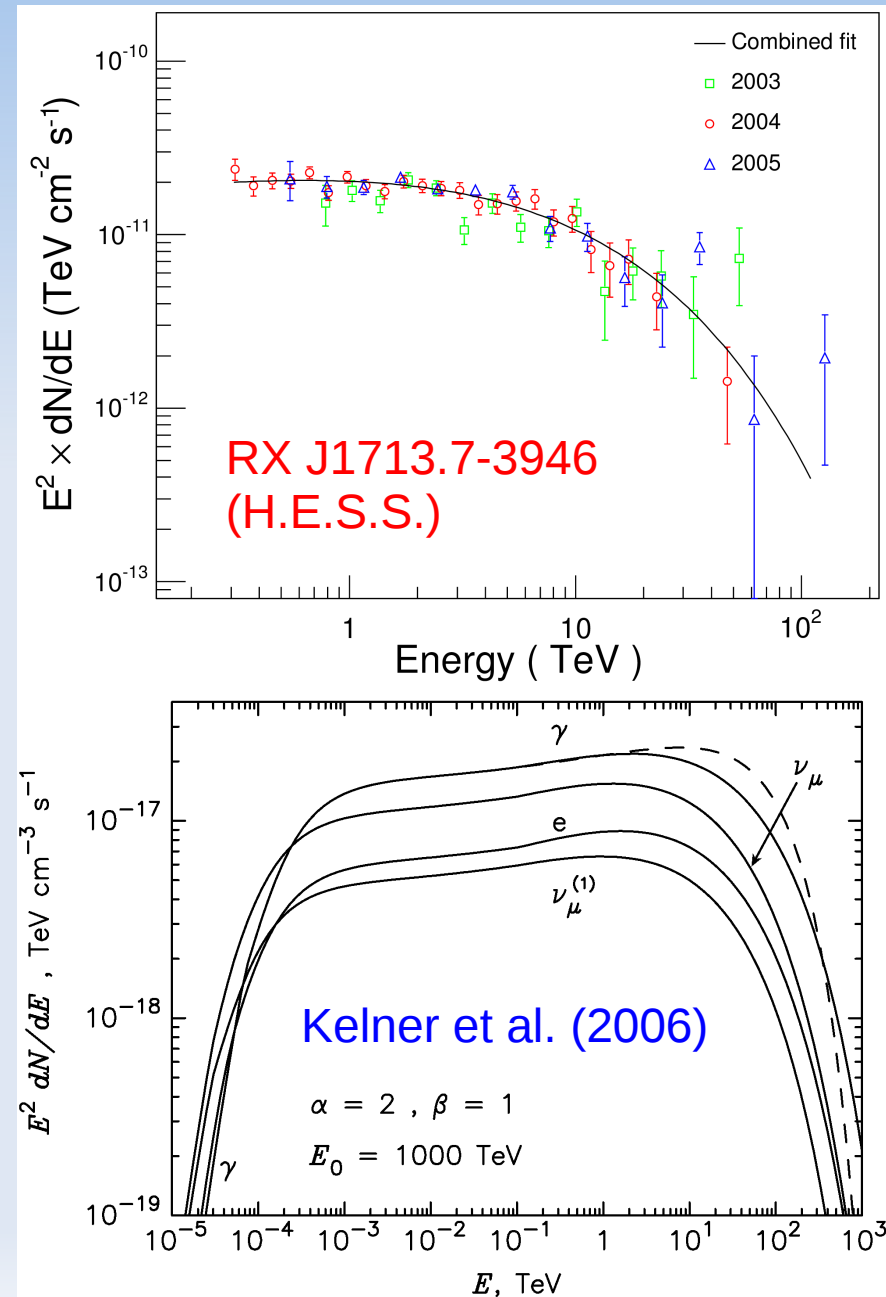
# PeV Explorer

- TenTen Project
  - Effective area of **10 km<sup>2</sup>** at energies **> 10 TeV**
  - Stereoscopic array of 30-50 telescopes
- PeV Explorer: one cell of TenTen
  - Cost-effective design:
    - Inter-telescope spacing exceeding 250 m
    - Mirror area 10-20 m<sup>2</sup>
    - Field of view 5°-10°
  - Best site in Australia (dry, flat, and low altitude)
  - Long exposure (several 100 hr) → key science

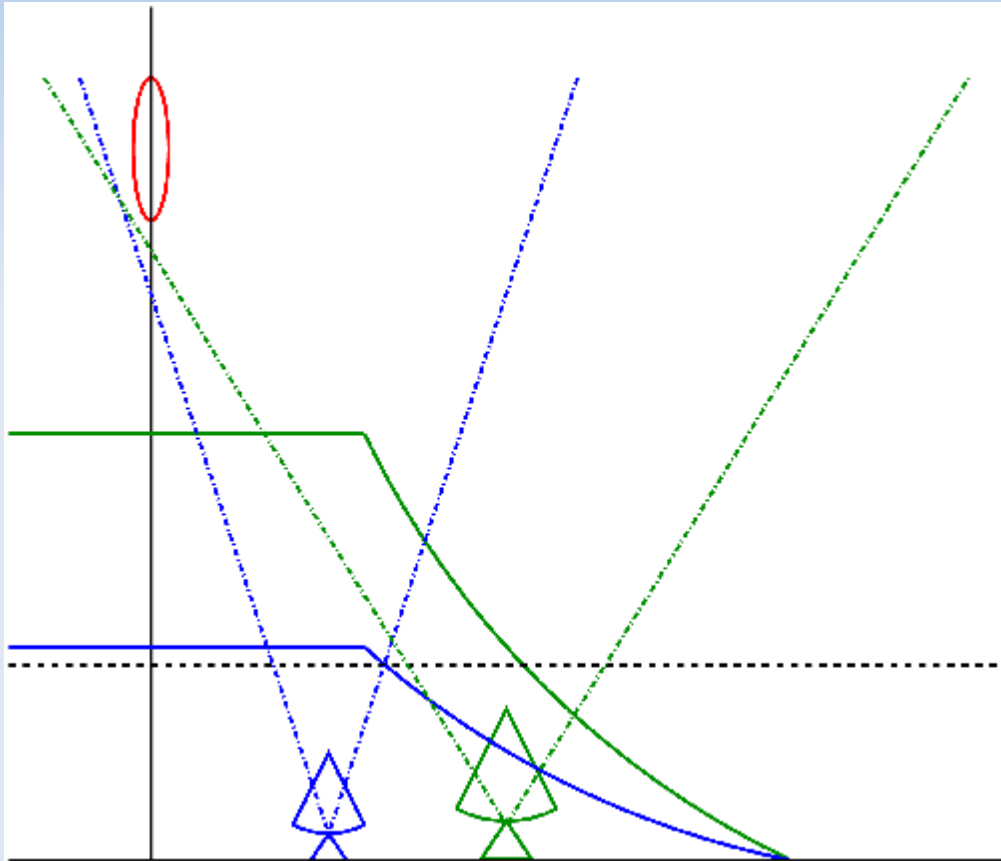


# Key Science

- Origin of Galactic cosmic rays
  - SNR shell is the origin up to the knee?
- E.g. RX J1713.7-3946
  - Cut-off @ 18 TeV:  
**too low to explain the knee**
- Deeper observations necessary at higher E



# PeV Explorer Concept



Plyasheshnikov et al. (2000)

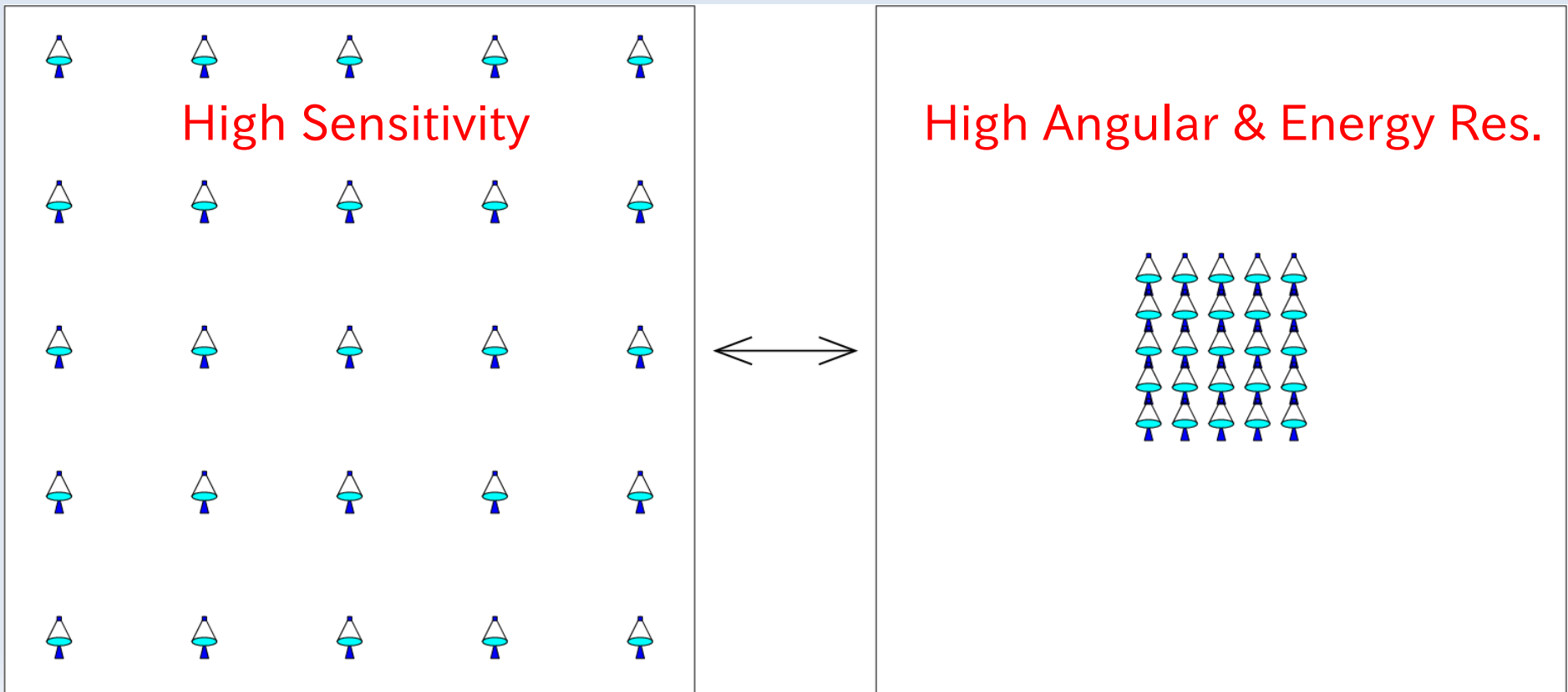
- Cherenkov plateau
  - Radius  $\sim 150$  m
- Cherenkov tail observable with larger aperture
  - Expand effective area
- Wider FoV necessary
- Effective area is a function of:
  - Aperture, span, FoV

# R & D

- Low power consumption system & high capacity battery
  - Make the telescopes independent of the power line
  - Analog Memory Cell (AMC) ASIC → 遠山講演
  - Compact analog delays
- Simulation study
  - Cherenkov image time gradient, etc.
- Test observations at Akeno
  - Reuse the Konan Telescope

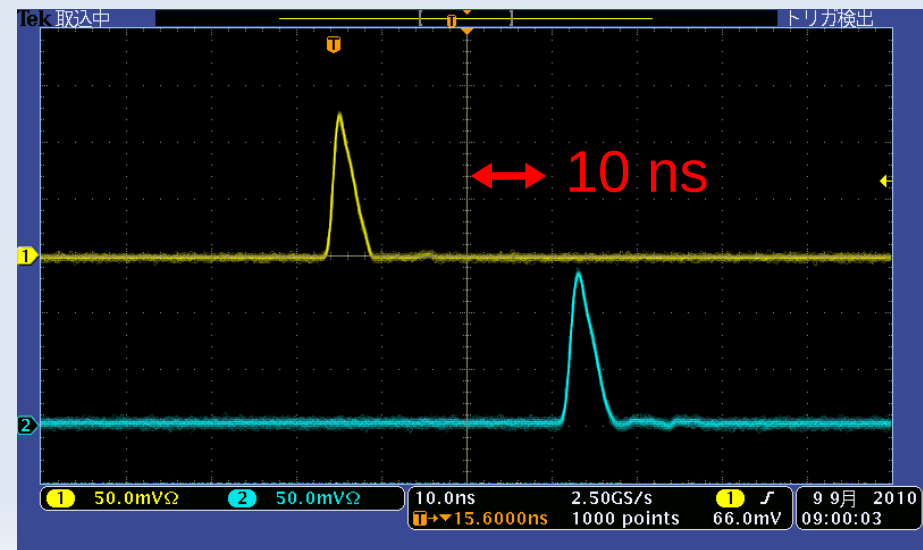
# Expansion Plan

- “Mobile Telescope Array”
  - Reduce the risk in array optimization
  - Telescopes independent of power line needed



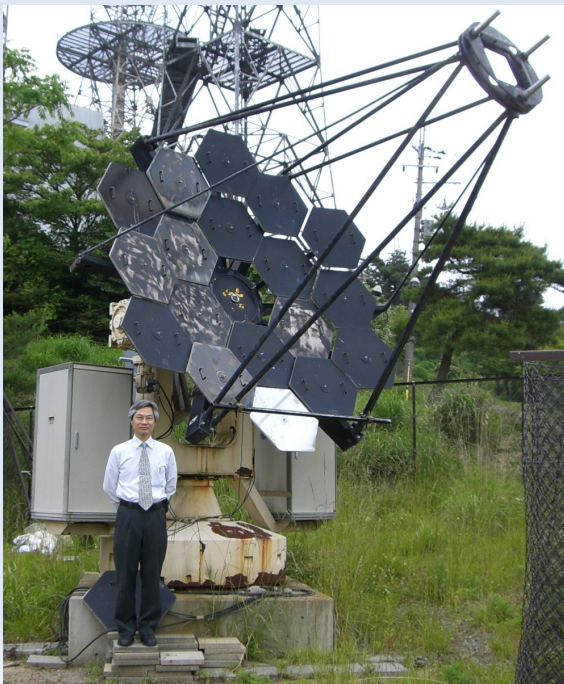
# Optical Delays

- E/O & O/E converters
  - Improvement of a commercial system
- Reproducible
  - Dynamic range almost 3 orders of magnitude
- Feasibility?
  - Cost reduction
  - Make analog delays compact



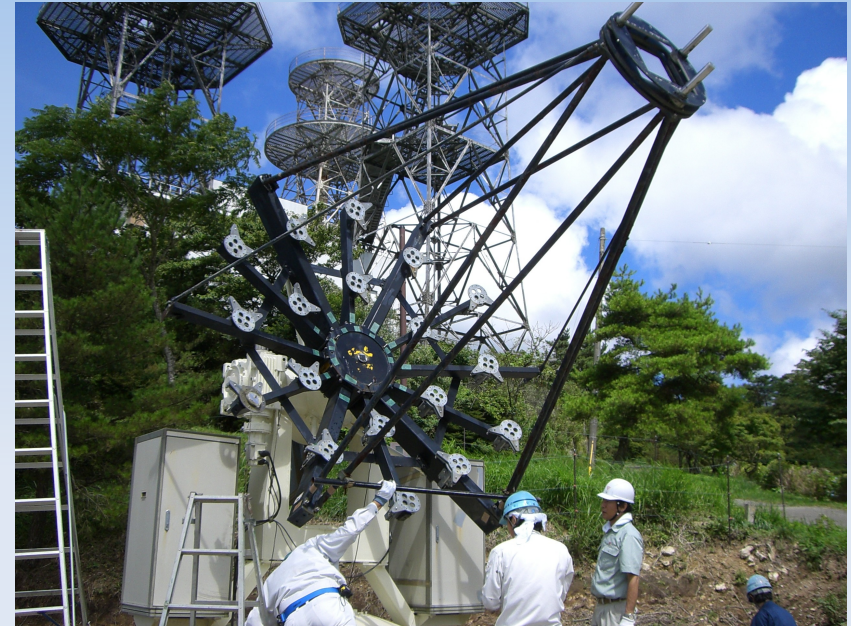
# Reuse of the Konan Telescope

- Test bench of Cherenkov telescope systems
  - No Cherenkov telescope operable in Japan
- 3 m aperture, Davies-Cotton optics
- Re-installation at the Akeno Observatory





# Removal of the Telescope



# Current Status & Plan

- Telescope parts (motors, encoders, ...) checked and repaired in a factory
  - Waiting for a re-estimate for repairing
- Re-installation at Akeno in this fiscal year
- Drive control software implanted from CANGAROO-III
- Used for R & D
  - PeV Explorer, CTA, ...
  - Test observations

# Summary

- PeV Explorer aims to explore:
  - Origin of Galactic cosmic rays
  - Astrophysics at energies  $> 10$  TeV
- R & D for PeV Explorer
  - Development of the system ongoing
    - Optical delays (E/O & O/E converters), AMC, ...
- Konan Telescope will be re-installed at Akeno
  - Usable for various R & D