

# SIMULATION AND OPTIMISATION FOR THE RADAR ECHO TELESCOPE FOR COSMIC RAYS

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## RADAR ECHO TELESCOPE FOR COSMIC RAYS

- Radar echo method will detect the in-ice core of cosmic-ray air showers penetrating a high elevation ice sheet
- Instrument large volumes of dense media
- Primary energy range 10 PeV - 10 EeV
- To be deployed at Taylor Dome, Antarctica

### SURFACE DETECTOR

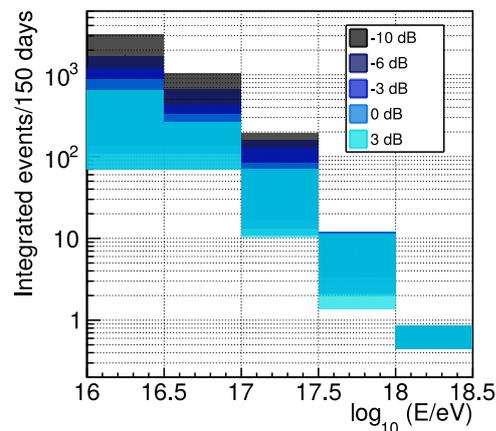
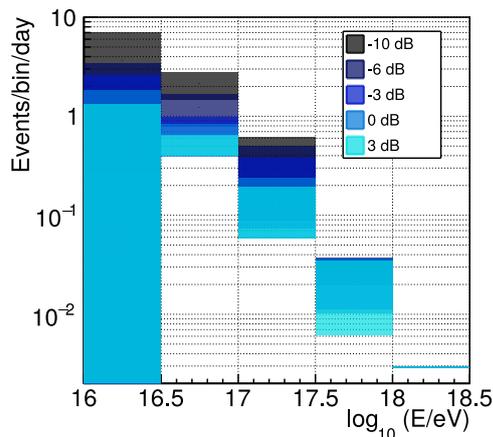
- Scintillators and radio antennas (30-300 MHz)
- Target 100% efficiency for primary energy  $\geq 100$  PeV
- Expect one 100 PeV event per day
- Simulated using CORSIKA with CoREAS and Geant4

### RADAR DETECTOR

- Phased array transmitter and receivers
- Detect radio reflections from in-ice cascade
- Air shower core propagation through ice simulated with Geant4
- Radio reflection simulated with RadioScatter

## EVENT RATE

- 1 event per day in radar detector at SNR of 0 dB
- 150 events per summer at SNR of 0 dB



Left: RET-CR event rate per day as a function of energy. Right: RET-CR events rates per Southern Hemisphere summer (approximately 150 days).