

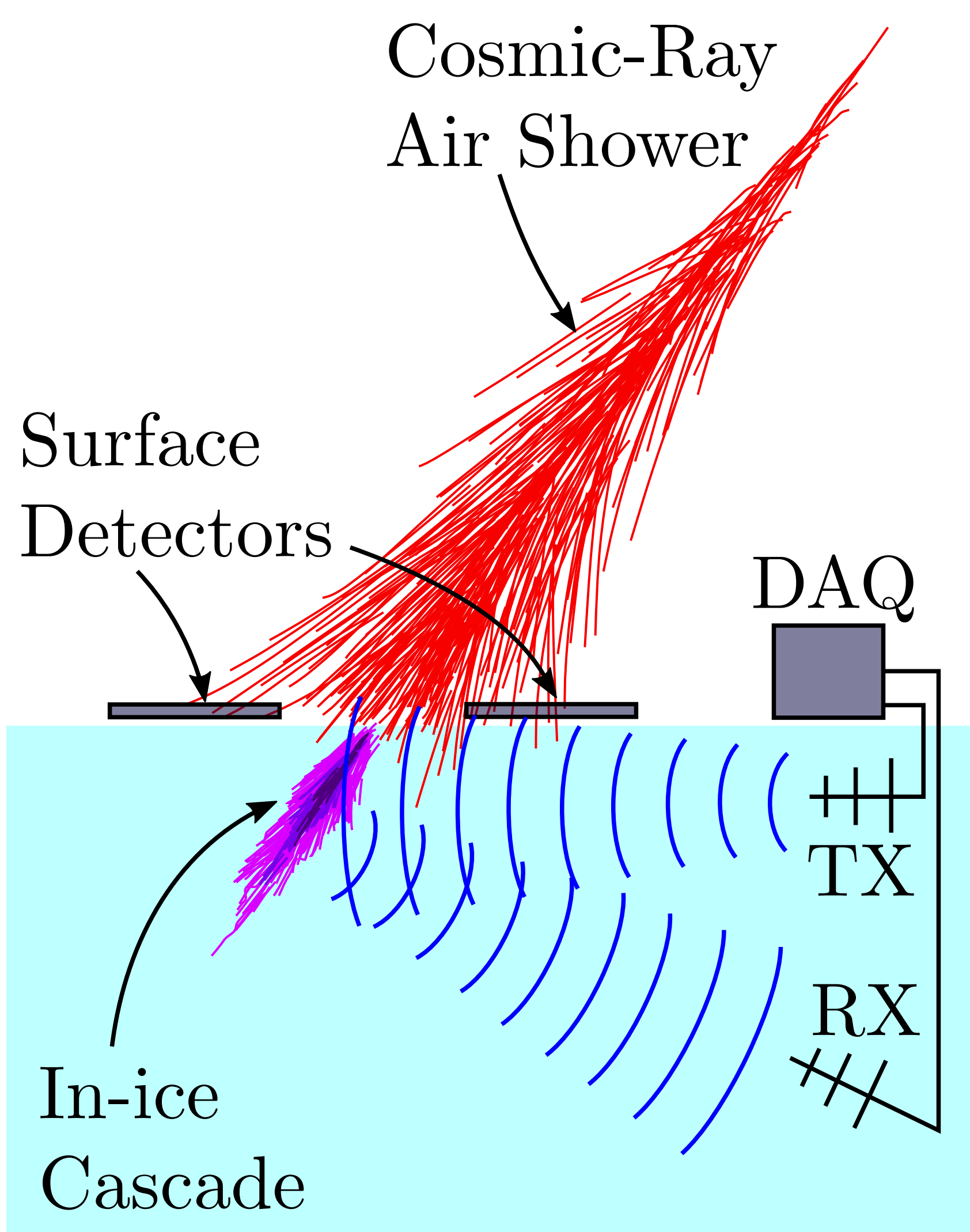


# The Radar Echo Telescope for cosmic rays and neutrinos

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for the RET collaboration



## Cosmic rays

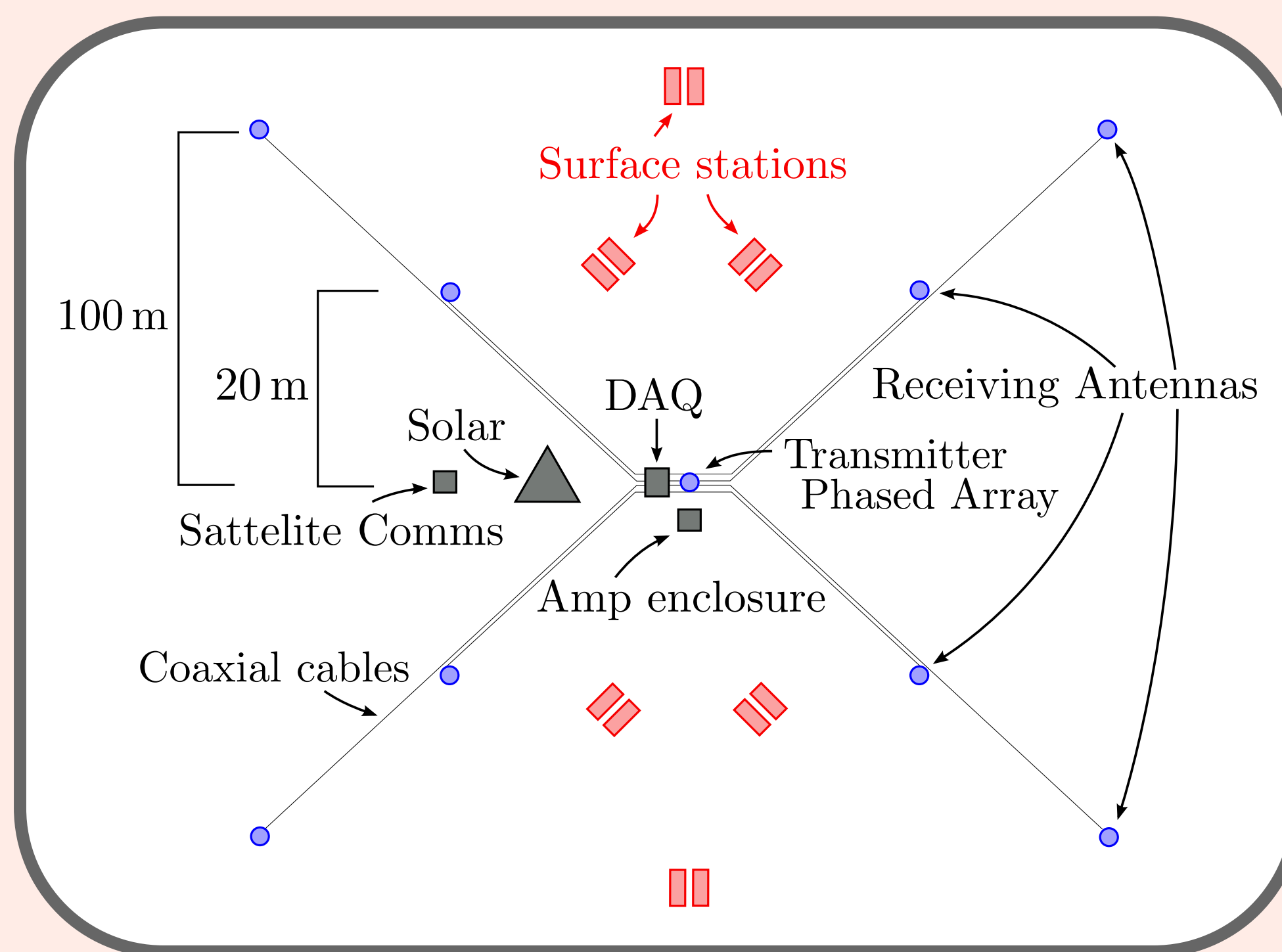


**Surface scintillators** detect cosmic-ray air shower particles

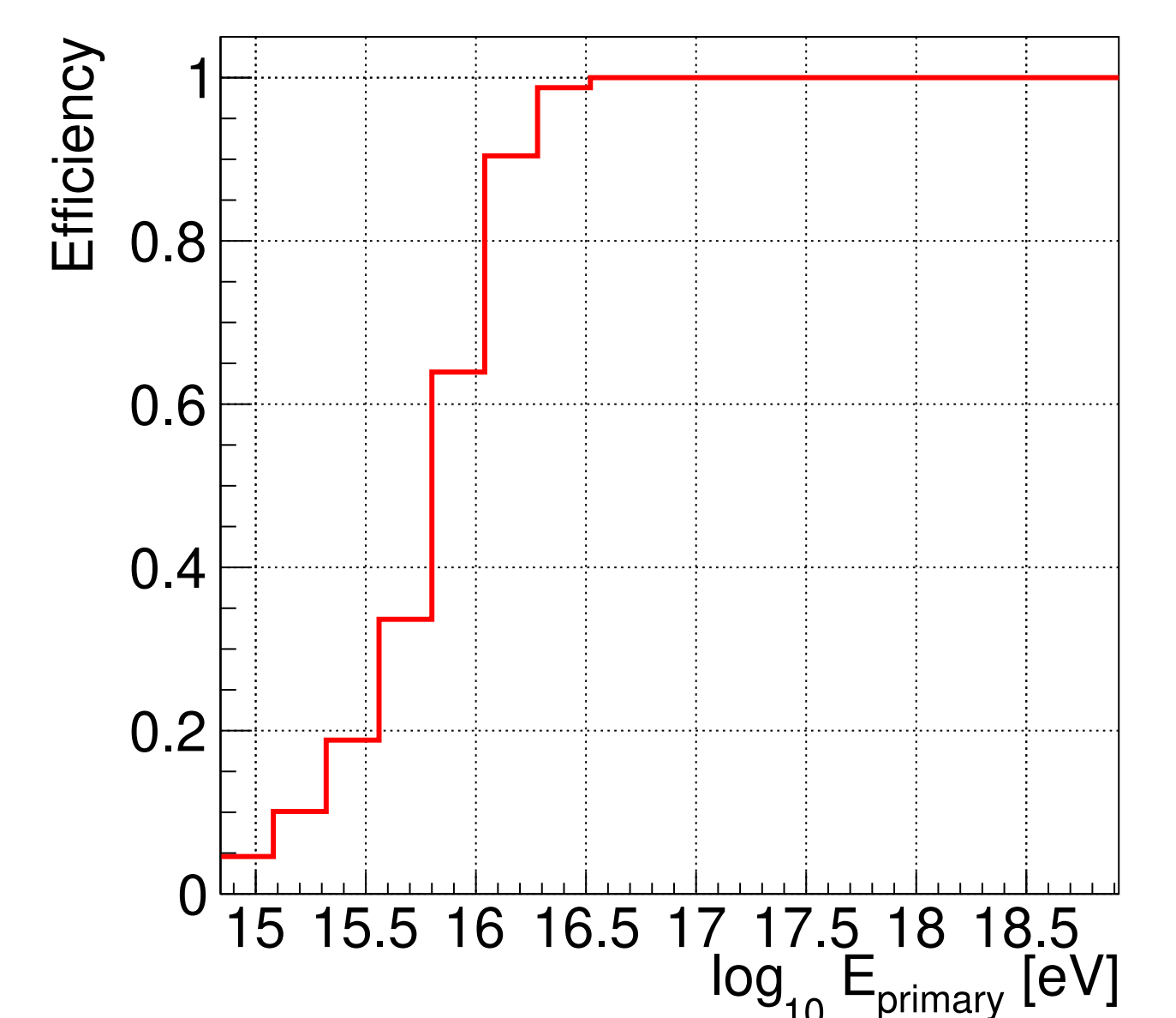
- ▶ External trigger for the in-ice radar detector
- ▶ Independent reconstruction of energy, core position and arrival direction

**Radar component** detects in-ice particle cascade

- ▶ In-nature proof of concept for detecting high-energy particle cascades using radar echoes
- ▶ Validate simulation framework, radar triggering capabilities and radar reconstruction techniques using scintillator information

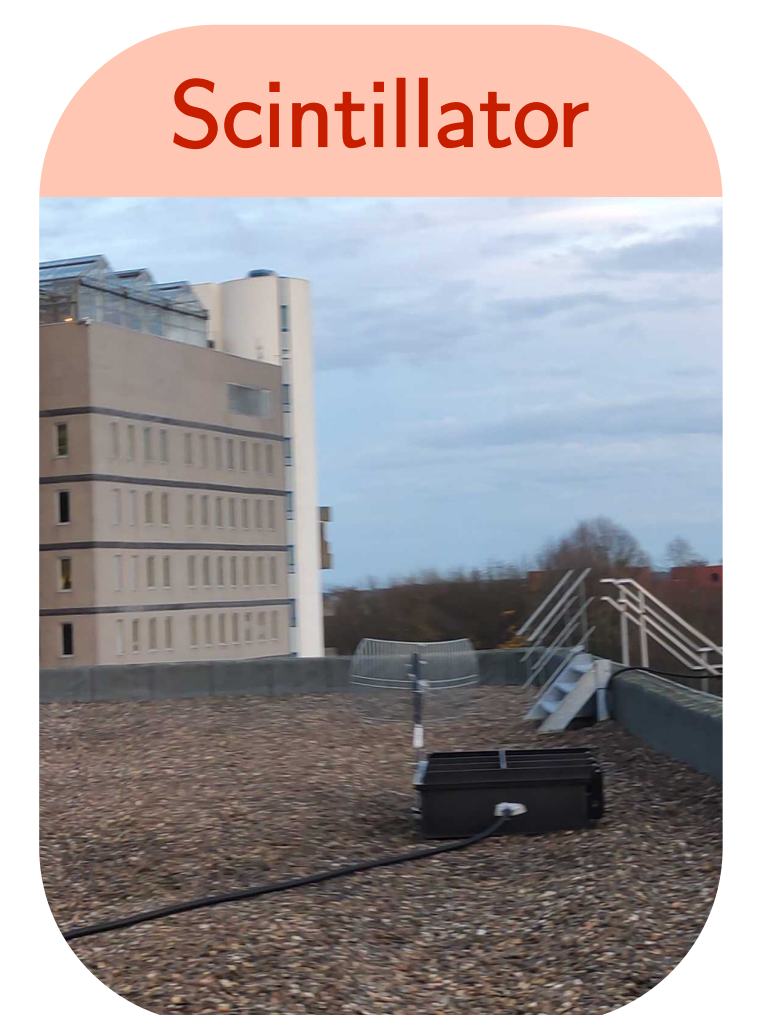
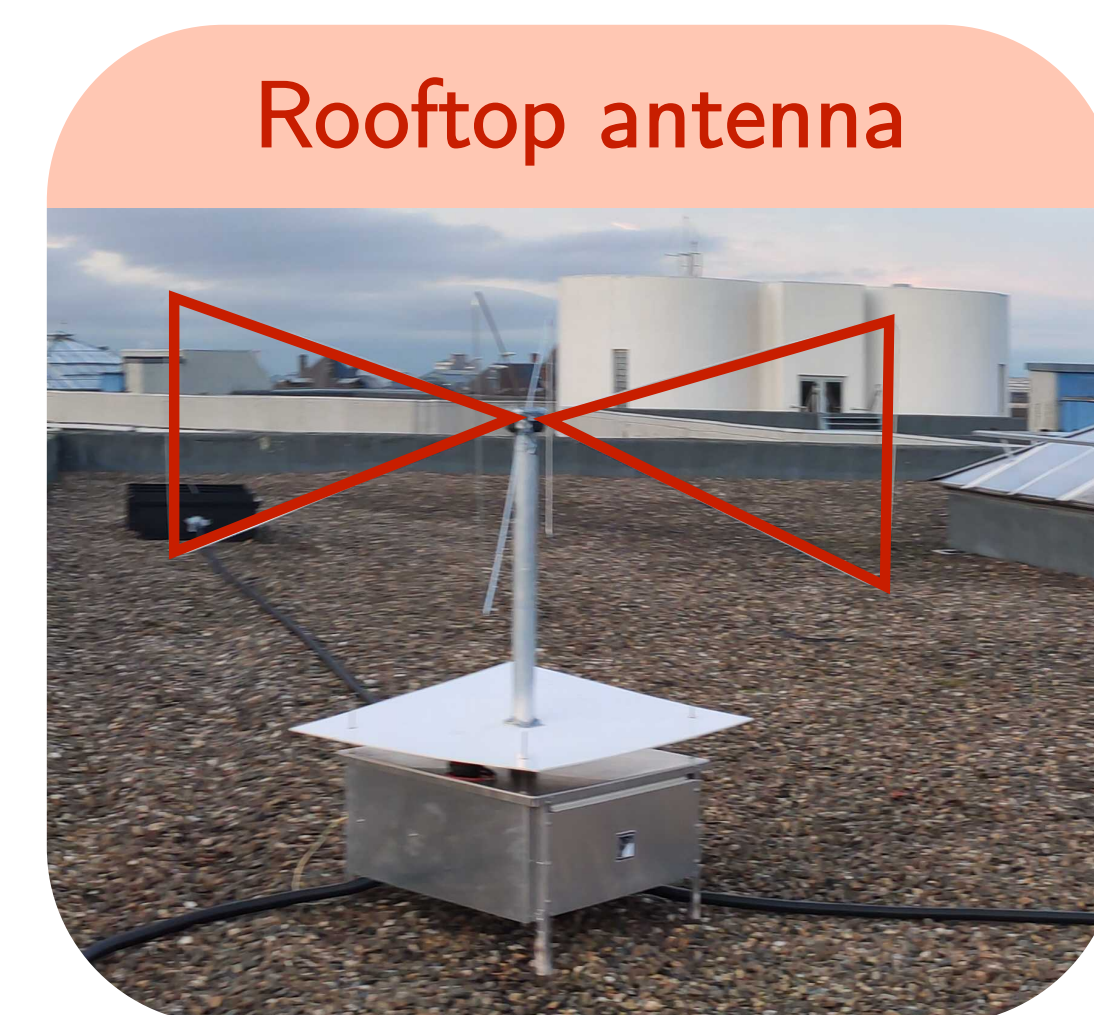


Simulation of the trigger efficiency of the surface detector using CORSIKA, CoREAS and Geant4.

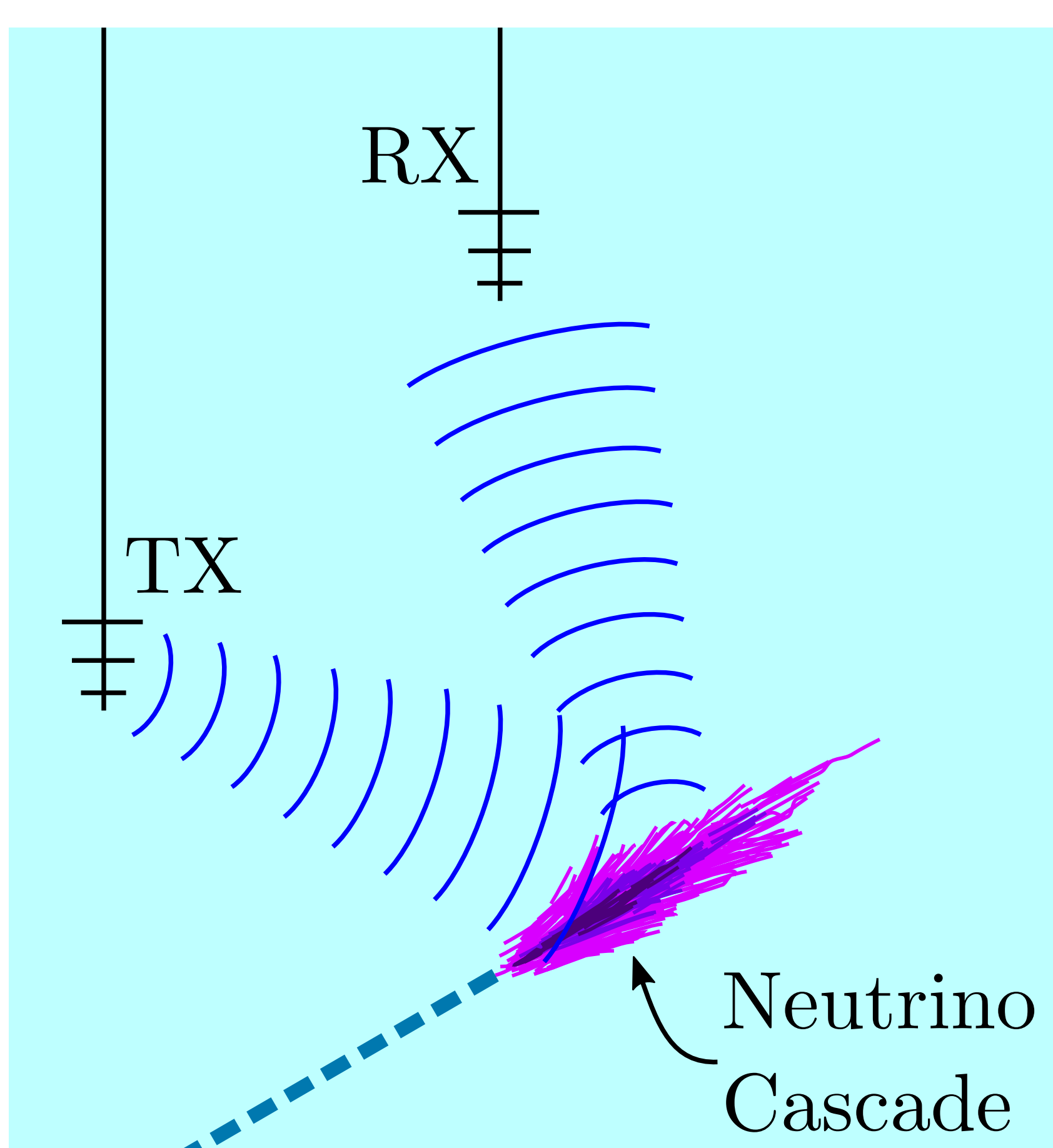


**Prototyping of the surface detectors at VUB campus**

- ▶ Testing system for communication and antenna triggering
- ▶ Preliminary data collection for background filtering and reconstruction



## Neutrinos



Detection of particle cascades created by **astrophysical neutrinos** in ice using **radar**

- ▶ Target neutrinos above 10 PeV energies, extending sensitivity of optical neutrino observatories
- ▶ Independent triggering and reconstruction
- ▶ Different dedicated simulation frameworks: RadioScatter (particle-level) and MacroScatter (macroscopic modelling)

The neutrino sensitivity of the Radar Echo Telescope (RET) based on simulations using RadioScatter. One station is defined as a 40 kW transmitter and 27 receiving antennas.

