Monocular Energy Spectrum using the TAx4 FDs
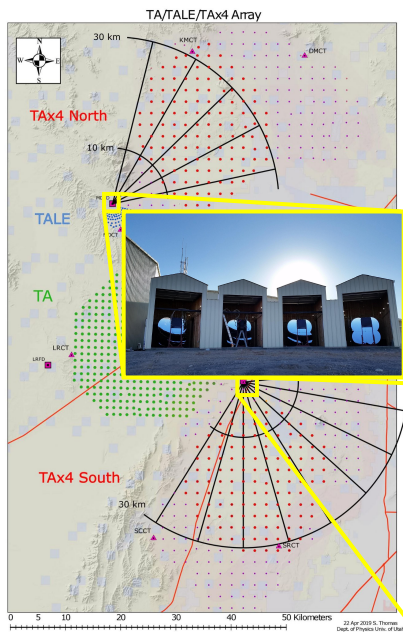
What is TAx4?

- Fourfold increase in size of TA SD array.
  - 257 of 500 planned scintillator SDs are deployed at 2.08 km spacing
  - Added 2 FD stations, 12 telescopes

TA/TALE/TAx4 Array

What have we done?

- Generated MC using QGSJetII-03 protons thrown at E^{-2} power law
- Reconstructed the energies and directions of UHECRs from the signals detected by the TAx4 FDs.
- Examined the TAx4 FD's performance and produced a preliminary monocular energy spectrum.
- Used hybrid reconstruction to examine data events.

What are the future plans for TAx4?

- A monocular energy spectrum is the first step towards my goal of generating a hybrid energy spectrum using the TAx4 detector for my Ph.D thesis.
  - Using a parametric hybrid MC to estimate the hybrid aperture and detector resolutions
  - Implementation of full hybrid MC is in progress.
  - I plan on graduating next summer and will be looking for new research opportunities.
- TA will work on hybrid composition

What are the current results?

- The preliminary monocular energy spectrum measured by the TAx4 FDs is in overall agreement with the TA ICRC2019 combined spectrum.

Ratio of Spectrum