

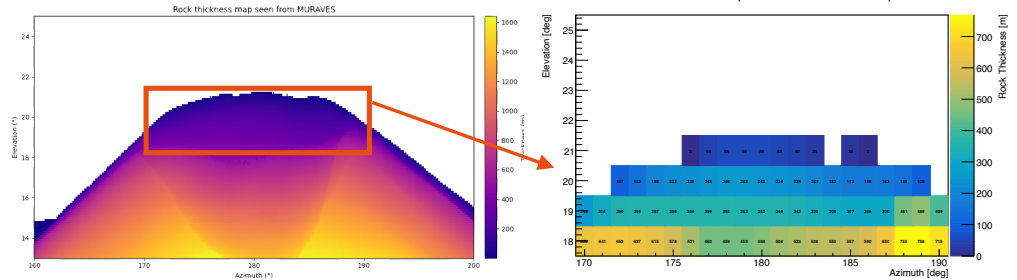
An orange decorative line on the left side of the slide, consisting of several segments: a vertical line at the top, a horizontal line to the left, a diagonal line down to the right, a vertical line down, and a final horizontal line to the left.

Cross check Double Ratio

Double Ratio

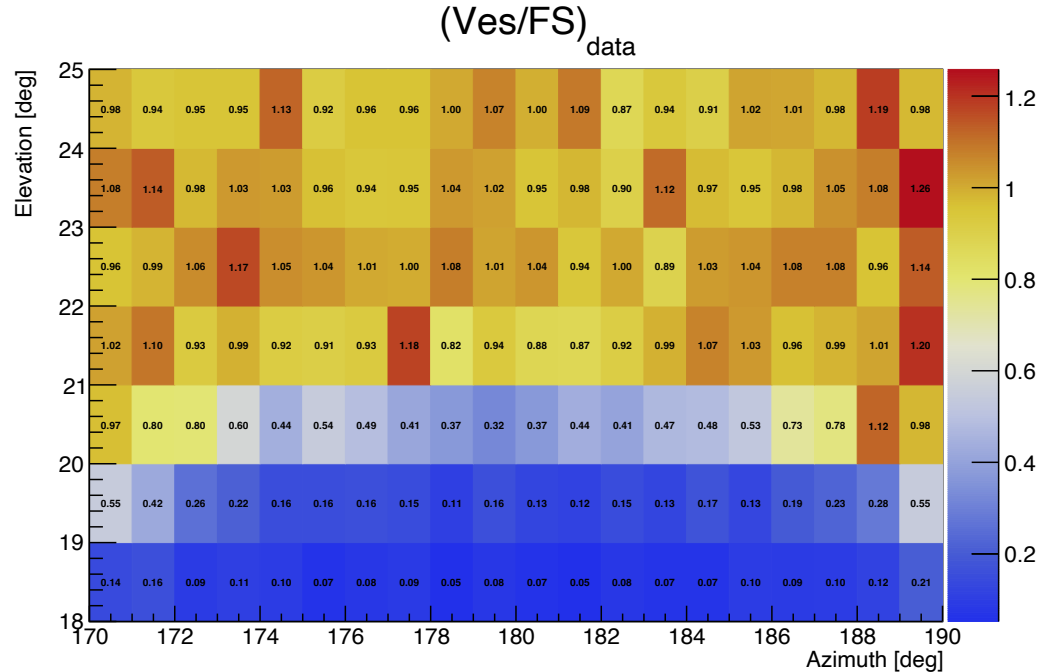
$$\text{ratio}_N = \frac{\frac{N_{meas}^{Ves} / \Delta T_{Ves}}{N_{meas}^{fs} / \Delta T_{fs}}}{\frac{I_{sim}^{Ves}}{I_{sim}^{fs}}}$$

analogous to relative transmission ratio, explicit unit conversion from measured counts to physical flux is no longer required.



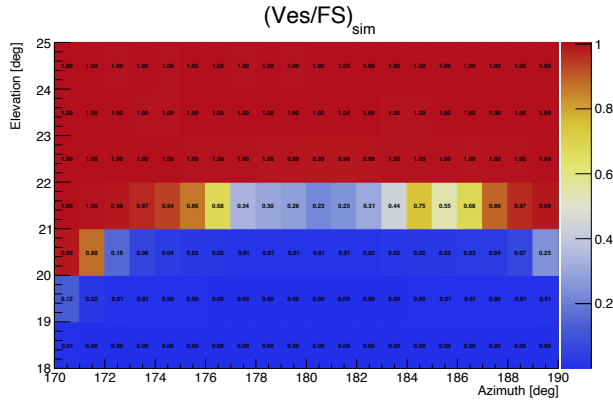
Rate Transmission of Data

$$\text{numerator} = \frac{N_{meas}^{Ves} / \Delta T_{Ves}}{N_{meas}^{fs} / \Delta T_{fs}}$$



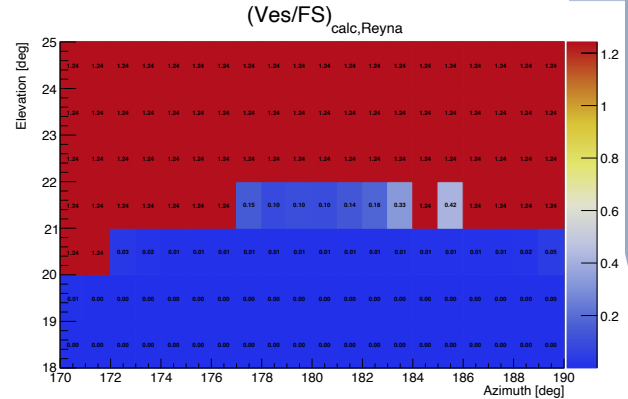
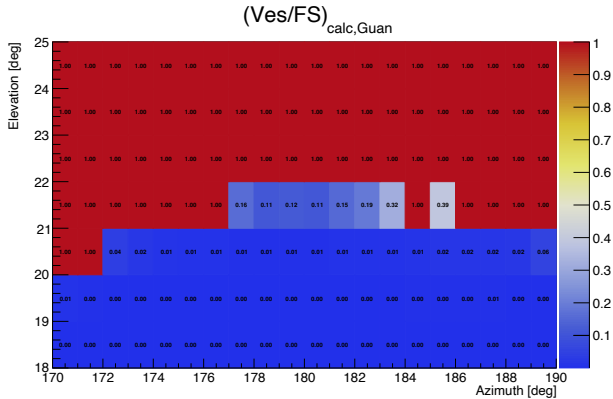
Rate Transmission of Simulation and Calculation

$$\text{denominator}_{sim} : \frac{I_{sim}^{Ves}}{I_{sim}^{fs}}$$



- ▾ Bulk density in both simulation and calculation:
 $\rho = 2.65 \text{ g/cm}^3$
- ▾ -> Similar magnitude.

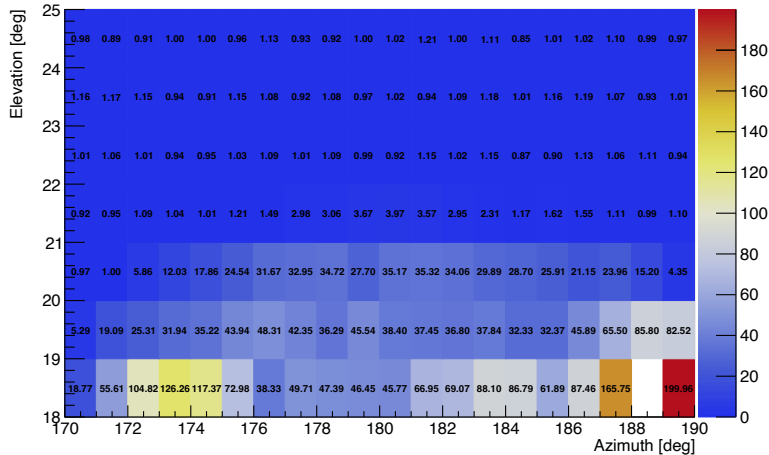
$$\text{denominator}_{calc} : \frac{I_{Calc}^{Ves}}{I_{Calc}^{fs}}$$



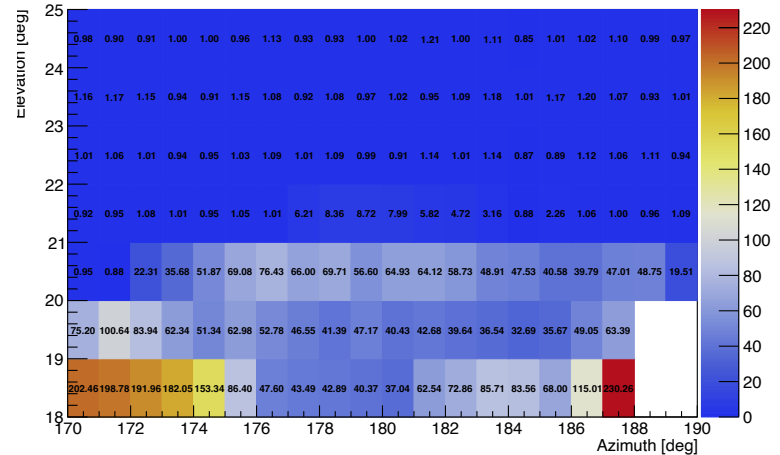
Double Ratio compared with Simulation or Calculation

- ▼ In elevation 19° - 20°, Double Ratio Calculation is in general bigger than Double Ratio Simulation.
- ▼ Expected muon flux in Gabor Calculation is in CSDA mode.
- ▼ Expected muon flux in Mulder Simulation is in discrete mode, with multiple scattering.

Double Ratio ROSSO WP15 vs $\rho = 2.65 \text{ g/cm}^3$, Discrete Mode



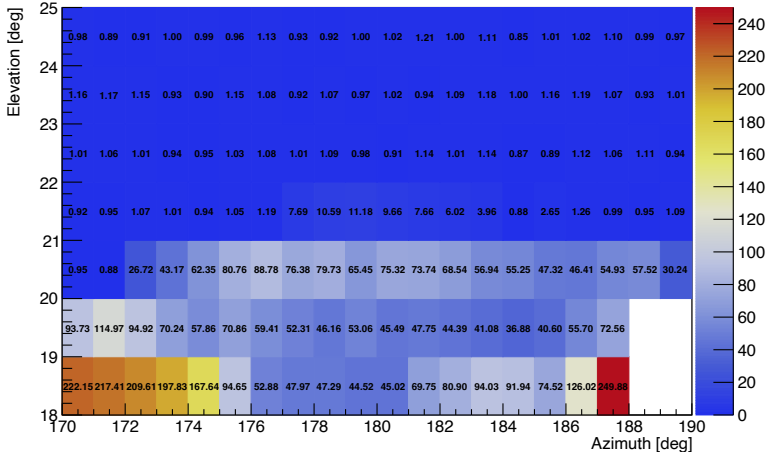
ROSSO WP15 vs Calc (Guan)



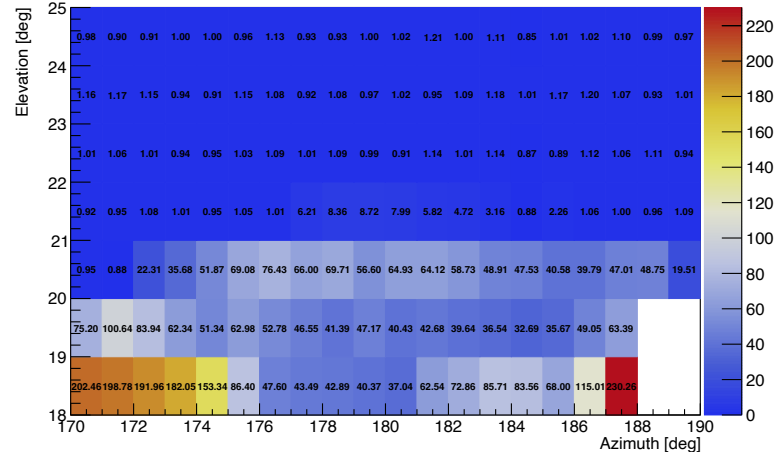
Double Ratio compared with Simulation or Calculation

- ▼ In elevation 19° - 21°, Double Ratio Calculation is in general bigger than Double Ratio Simulation.
- ▼ Expected muon flux in Gabor Calculation is in CSDA mode.
- ▼ Expected muon flux in Mulder Simulation is in same continuous mode -> similar values

Double Ratio ROSSO WP15 vs $\rho = 2.65 \text{ g / cm}^3$, continuous Mode



ROSSO WP15 vs Calc (Guan)



Filter Rn < 250

- ▼ Atm using **five-meter precision** DEM in simulations.
- ▼ -> Crater is ~1500m distance to the MURAVES detectors, for 1° in azimuth or elevation, spatial resolution of the detector at the Vesuvius crater -> $1500 \cdot \frac{\pi}{180} \approx 26.2 \text{ m}$.
- ▼ Suggested: run simulation in 0.2 degree (~ 5/26.2), then sum to per 1° .