The Radio Neutrino Observatory Greenland (RNO-G)

Observing the sources of ultra-high-energy neutrinos in the northern sky

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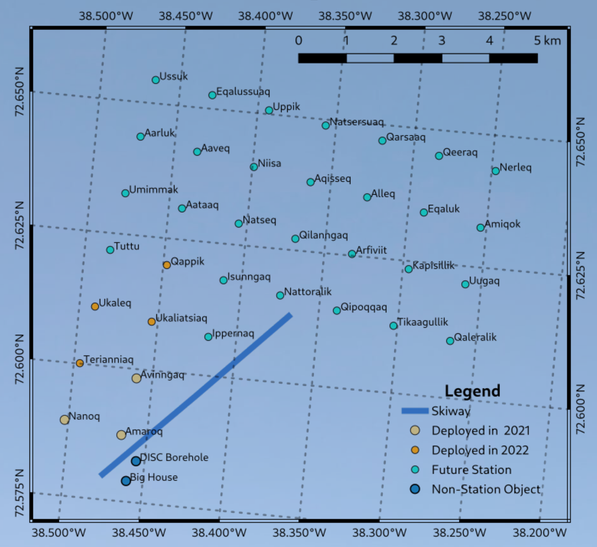
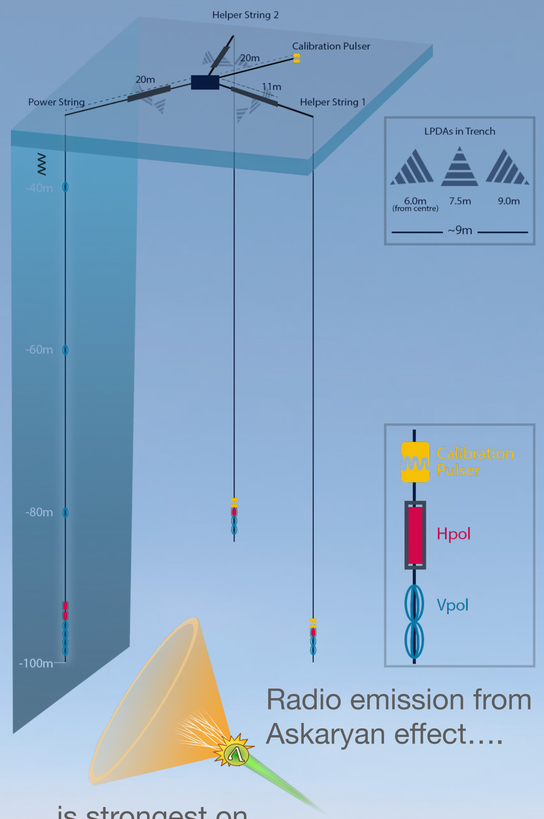
RNO-G Planned Layout



RNO-G will feature 35 autonomous stations with a spacing of 1.25 km on an total area of over 50 km² on top of a 3 km deep ice sheet. 24/7 satellite communication enables real-time alerts. 7 stations are already deployed and taking data!



Radio emission from Askaryan effect….

… is strongest on Cherenkov cone

Shallow component (3m)

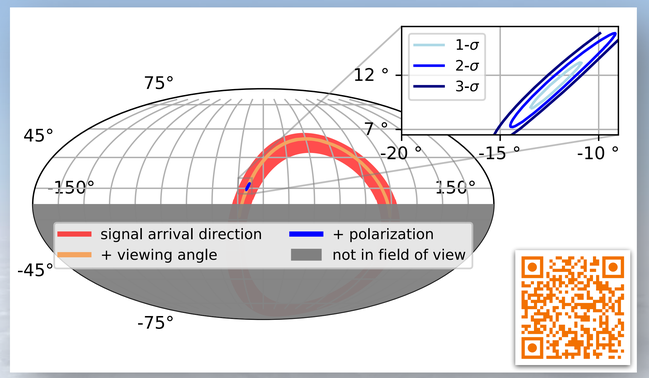
3 upward- and 6 downward facing LPDAs. Air shower veto with upward facing antennas. Excellent polarisation resolution for neutrino detection with downward facing antennas

Deep component (100m)

11 vertically- and 4 horizontally-polarised antennas. 4 Vpols are operated in a phased array for low-threshold trigger.

Exploring wind turbines for 24/7 operation all year round

Arrival direction reconstruction …



… depends on several observables

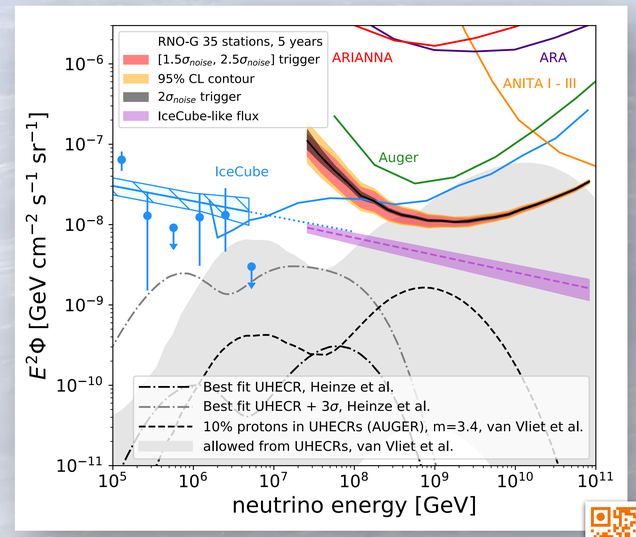
- Viewing angle: exploiting shape of waveform
- Polarisation: requires (strong) signal HPol antennas

Deep antennas only:

$$\sigma_{68\%}(E,\theta) = 1.7^\circ - 8.6^\circ$$

With — without Hpol signal

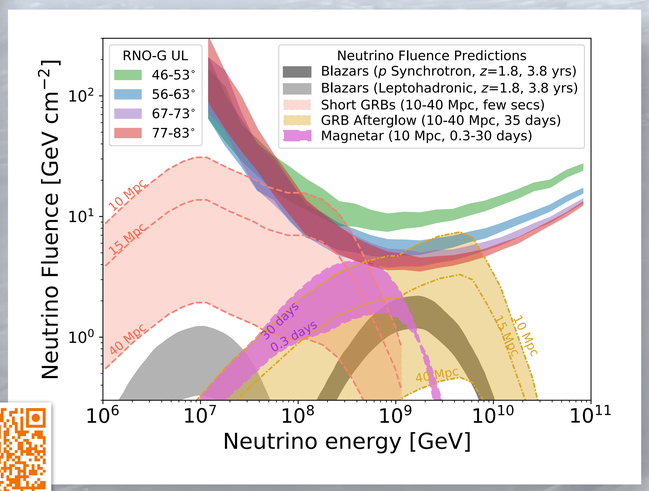
Diffuse flux sensitivity ….



… will put optimistic models to test.

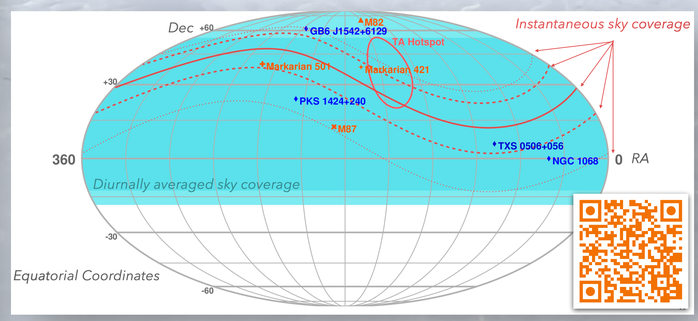
- 67% duty circle (solar power)
- Differential limit for full energy decade
- zero background

Transient source sensitivity …



… has potential to discover nearby sources

Total & instantaneous sky coverage



Most sensitivity between zenith angle of $\theta \approx 45^\circ - 83^\circ$

Allows observation of:

- Significant IC sources
- Prominent gamma-ray emitters
- TA hotspot

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Ice modelling: Poster by Bob Oeyen