

Interplay between eclipses and soft cosmic rays

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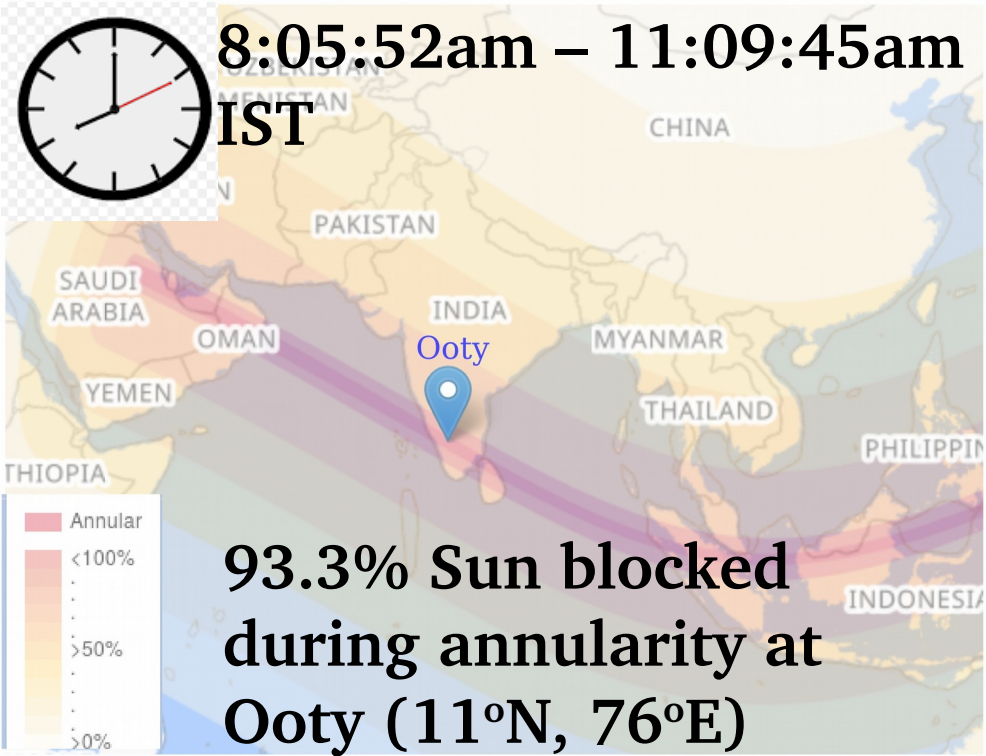
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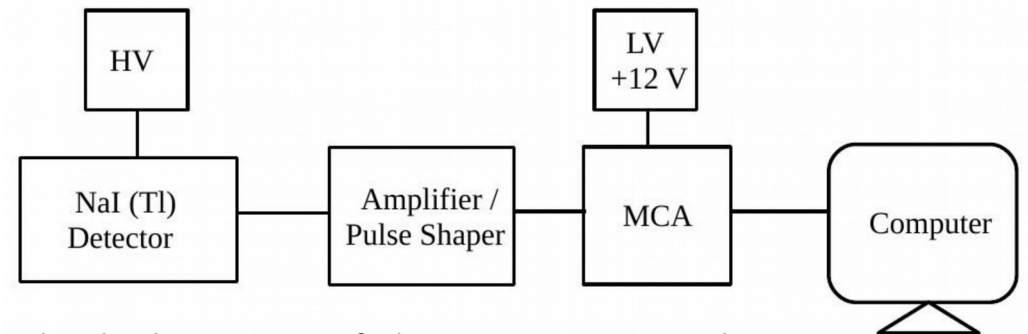
Outline

- Secondary cosmic gamma ray (SCGR) measurement using NaI(Tl) detector during :
 - Annular solar eclipse on 26 December 2019 at Ooty, India
 - Lunar eclipse on 31 January 2018 at Kolkata, India
 - Lunar eclipse on 27 July 2018 at Kolkata, India
- Summary

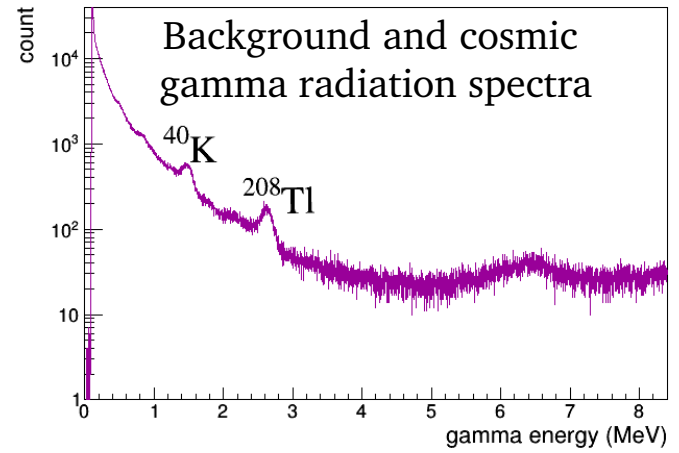
Annular solar eclipse on 26 December 2019



The eclipse map

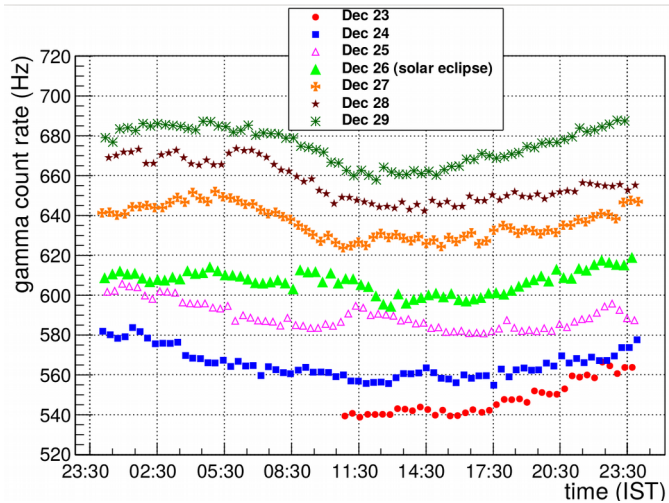


Block diagram of the experimental arrangement

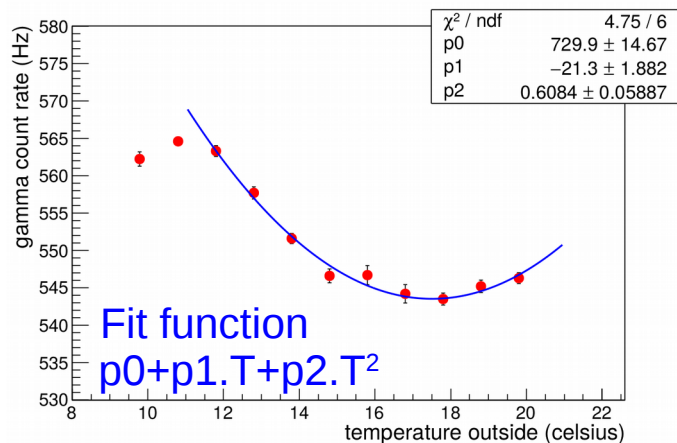
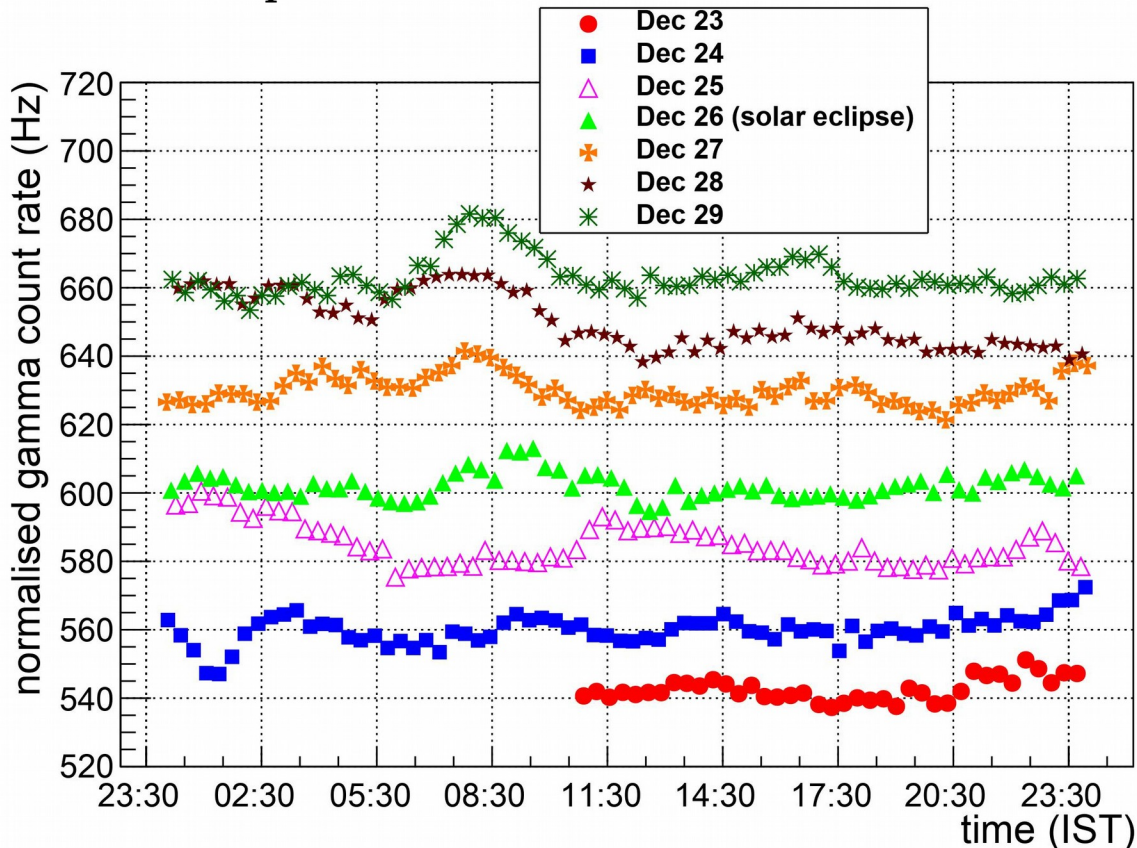


Gamma ray spectra with NaI(Tl) detector

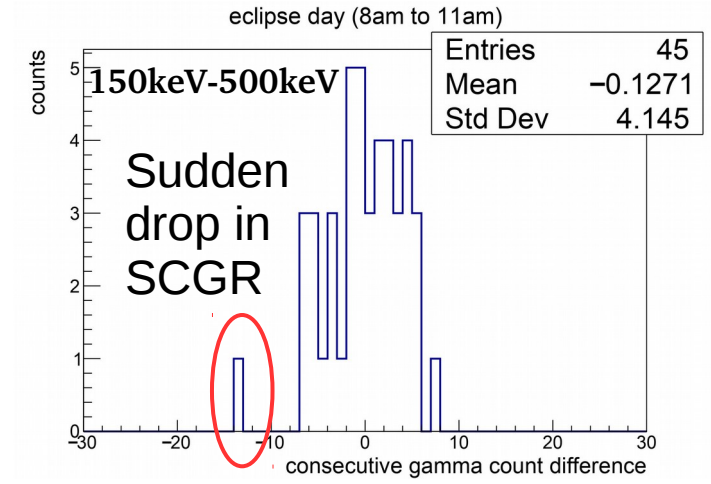
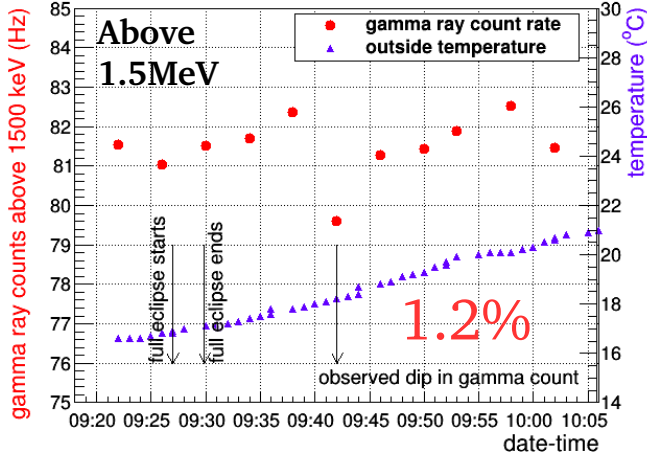
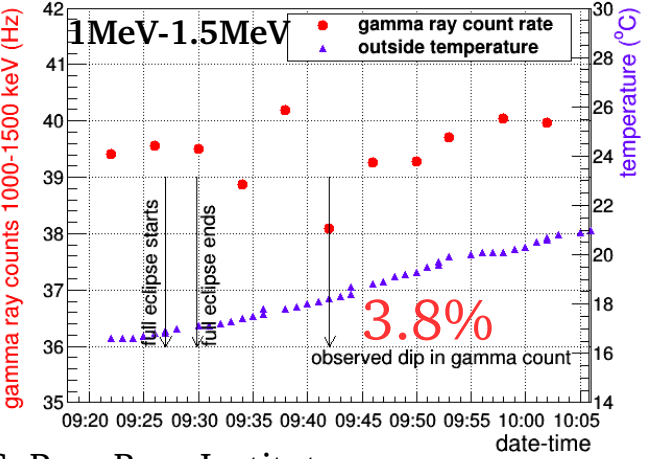
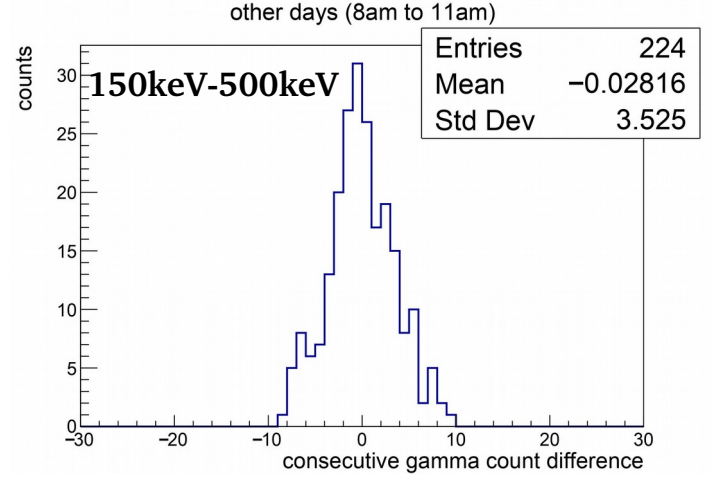
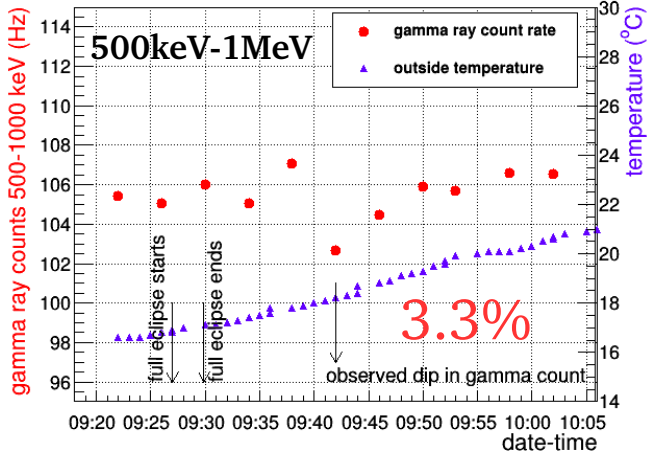
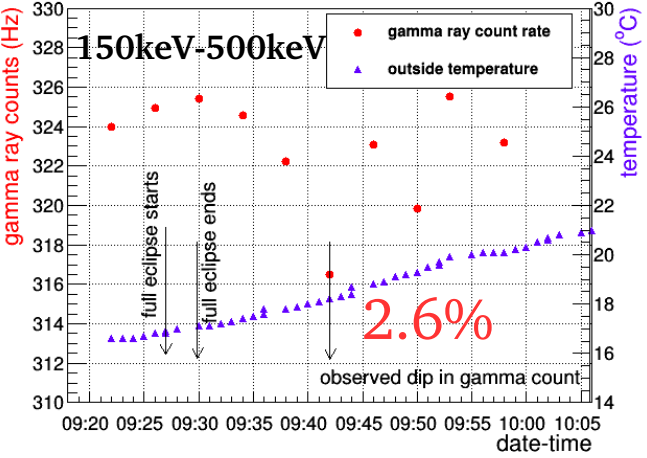
SCGR flux variation (temperature correction)



Temperature corrected SCGR flux variation

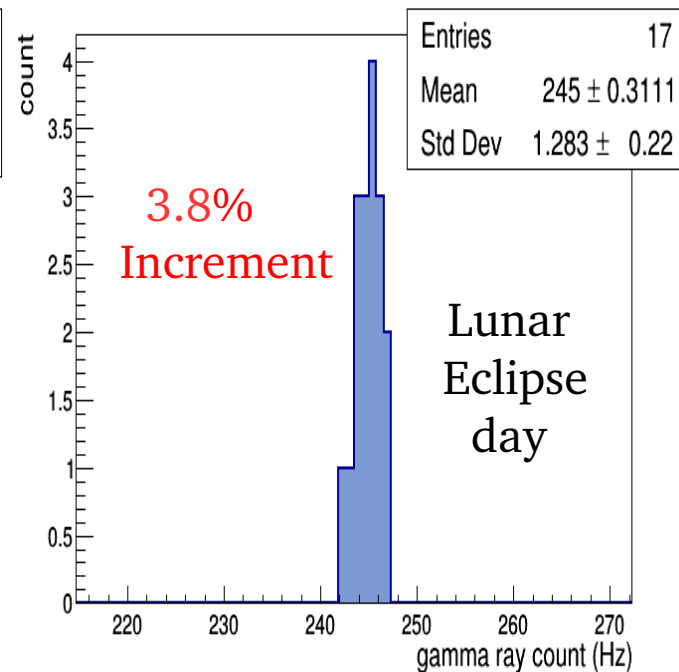
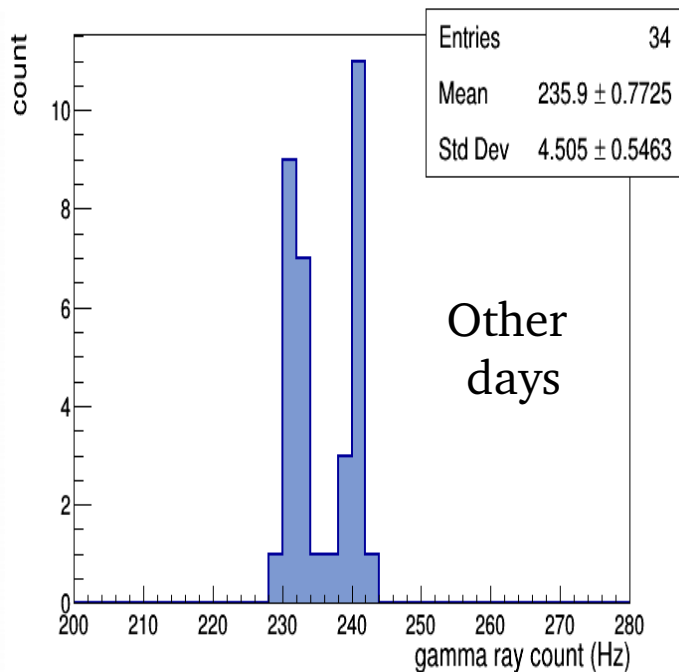
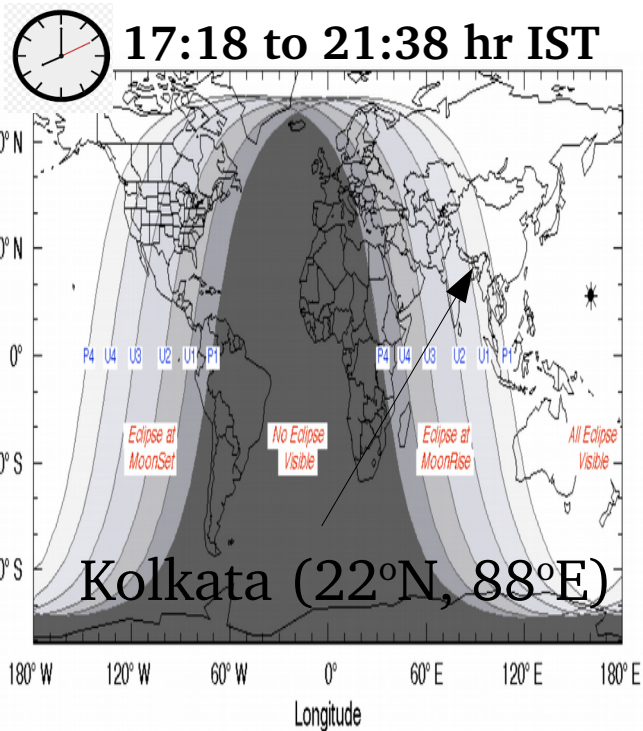


SCGR decrement observed in different energy regions



Lunar eclipse on 31 January 2018


Similar experimental arrangement as shown in page 3

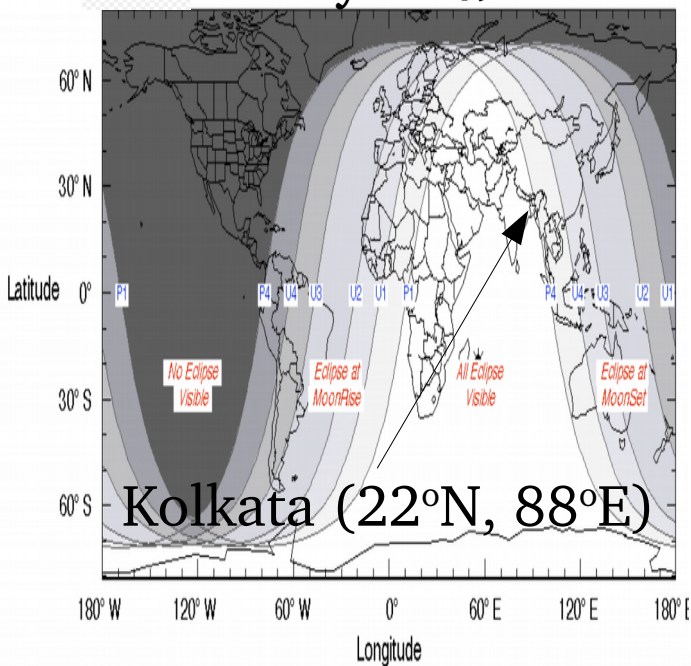


Visibility map of the lunar eclipse

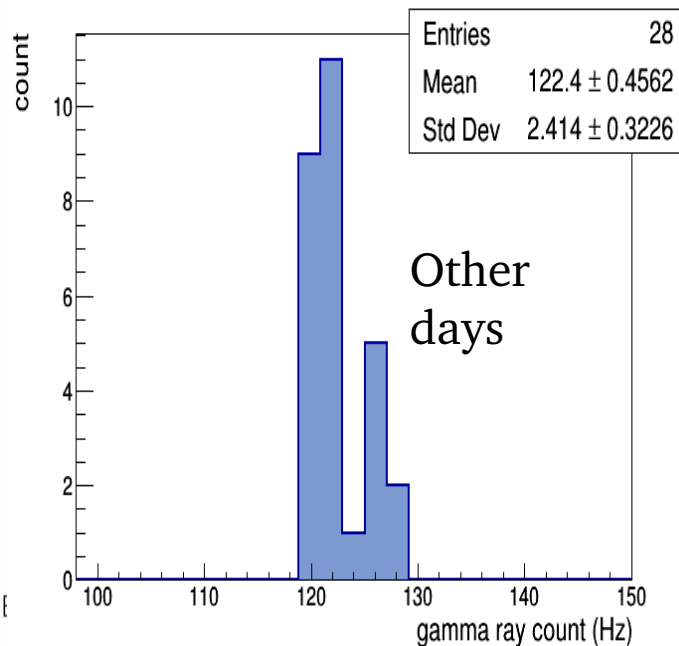
GCR distribution during lunar eclipse and other days in the energy range 25 keV to 3 MeV

Lunar eclipse on 27 July 2018

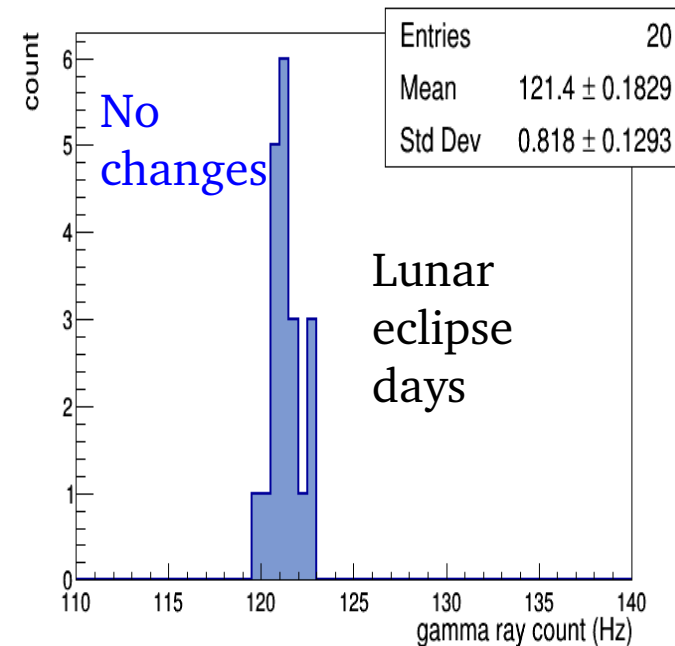
 27 July 22:44 hr to
28 July 03:49 hr IST



Visibility map of the lunar eclipse



GCR distribution during lunar eclipse and other days in the energy range 50 keV to 3 MeV



Summary

- Measurement of SCGR using NaI(Tl) detector during an annular solar eclipse (26 Dec 2019) has been carried out at high altitude (Ooty, India - 2240 m above sea level) for the first time.
- SCGR flux (or GCR) in the energy range 150-500 keV : **decrement of 2.6 %**
- Energy range 0.5-1 MeV : **decrement of 3.3%** ; Energy range 1-1.5 MeV : **decrement of 3.8%**
- Local weather parameters like temperature, pressure and humidity were monitored.
- Lunar eclipse on 31 January 2018 : **3.8% increase in SCGR flux** (or GCR)
- Lunar eclipse on 27 July 2018 : No changes in SCGR flux