

Rate vs Latitude

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Previous updates

<https://agenda.centrofermi.it/event/178/>

<https://agenda.centrofermi.it/event/182/>

EEE analysis meeting 6/04/2022

Last check

We perform few measurements in Bologna (POLA-02) changing the setting of the detector:

- orientation (different materials in the two sides, top and bottom)
- position of electronic box
- adding 0.6 cm steal shield

5 measurements

Posizione dritta nulla sopra

ore 10:53 /home/pi/Polar/Data/2022-03-14/POLA-02-2022-03-14-479641997.bin

Posizione dritta elettronica sopra

ore 11:38 /home/pi/Polar/Data/2022-03-14/POLA-02-2022-03-14-479644586.bin



Posizione rovesciata nulla sopra

ore 12:32 /home/pi/Polar/Data/2022-03-14/POLA-02-2022-03-14-479647922.bin

Posizione rovesciata elettronica sopra

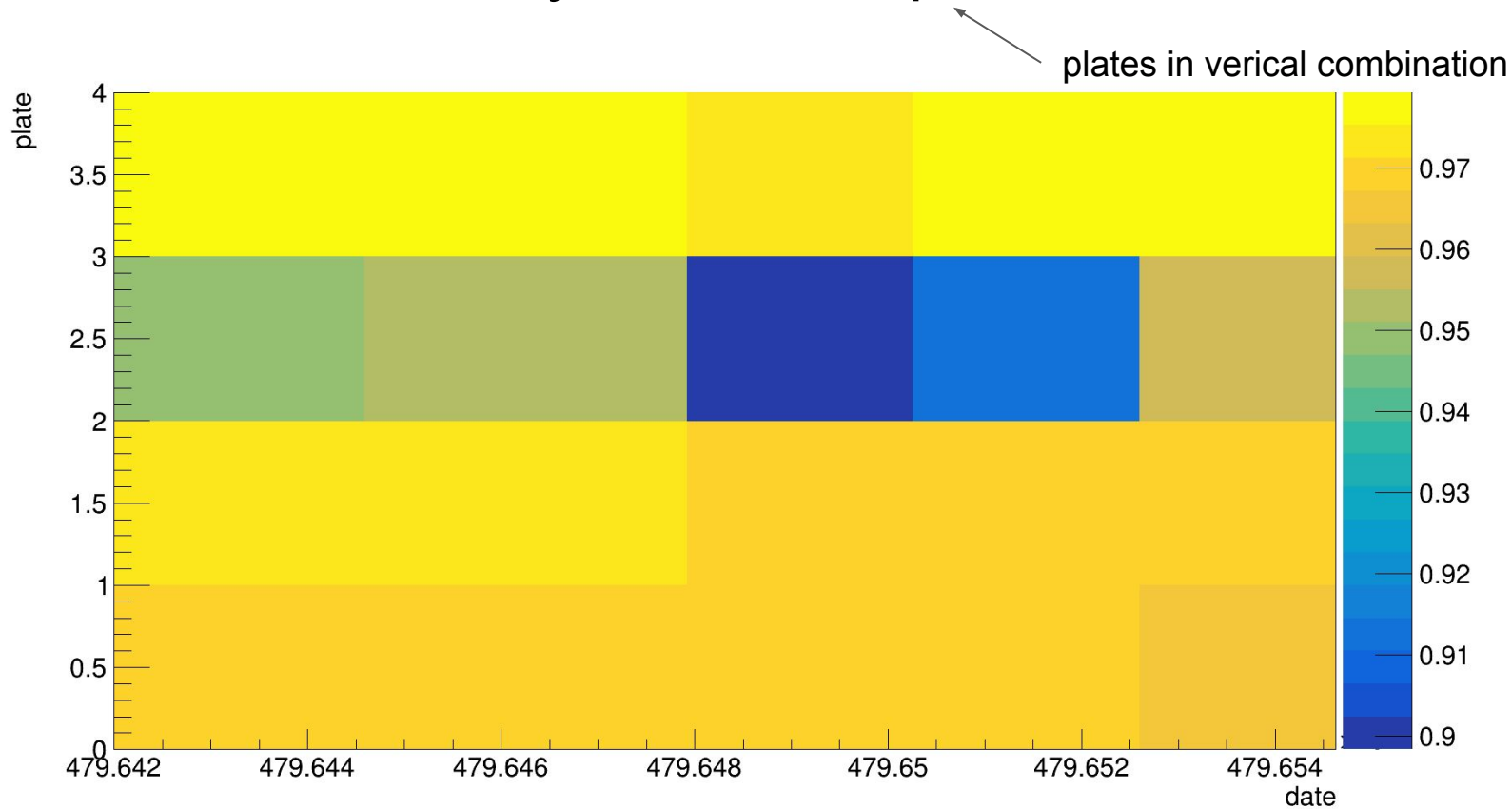
ore 13:11 /home/pi/Polar/Data/2022-03-14/POLA-02-2022-03-14-479650254.bin

Posizione rovesciata elettronica e "tettuccio-fake" sopra

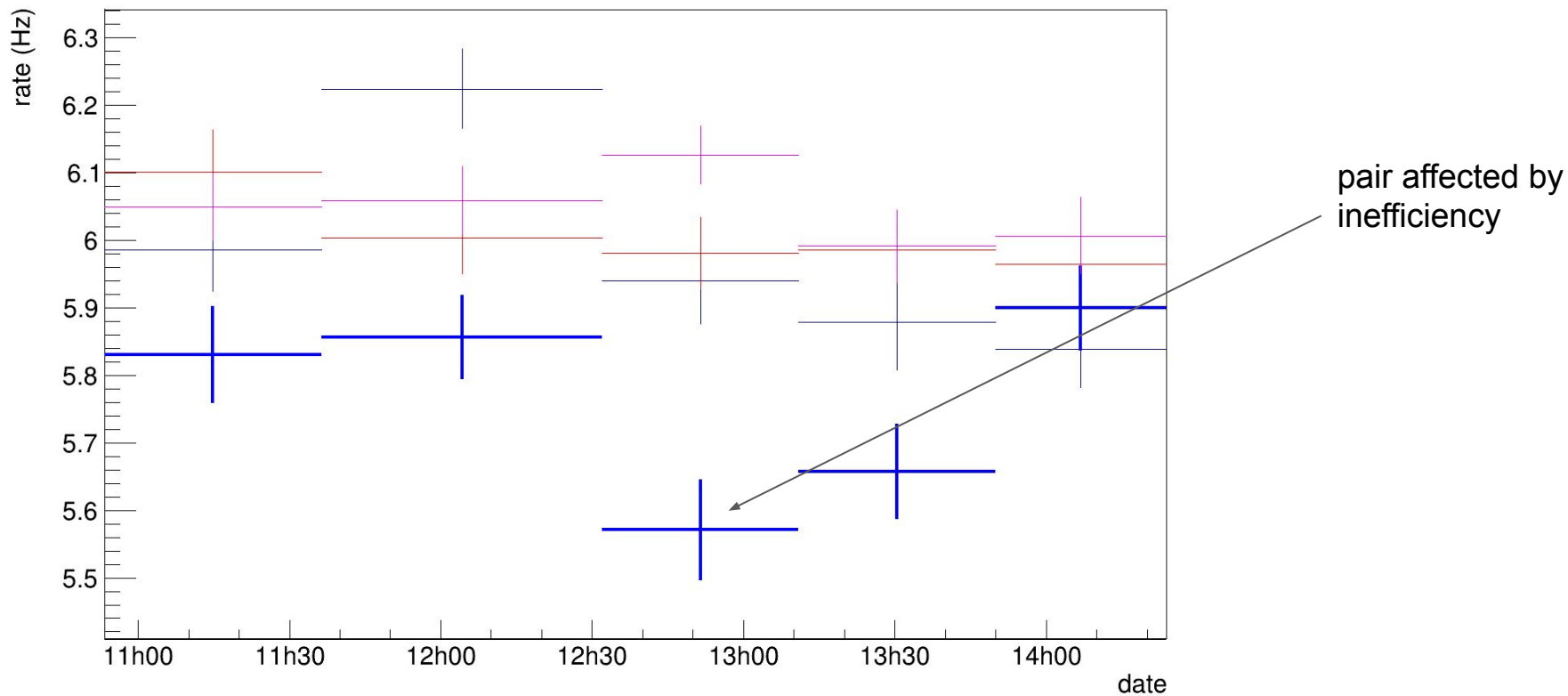
ore 13:48 /home/pi/Polar/Data/2022-03-14/POLA-02-2022-03-14-479652603.bin



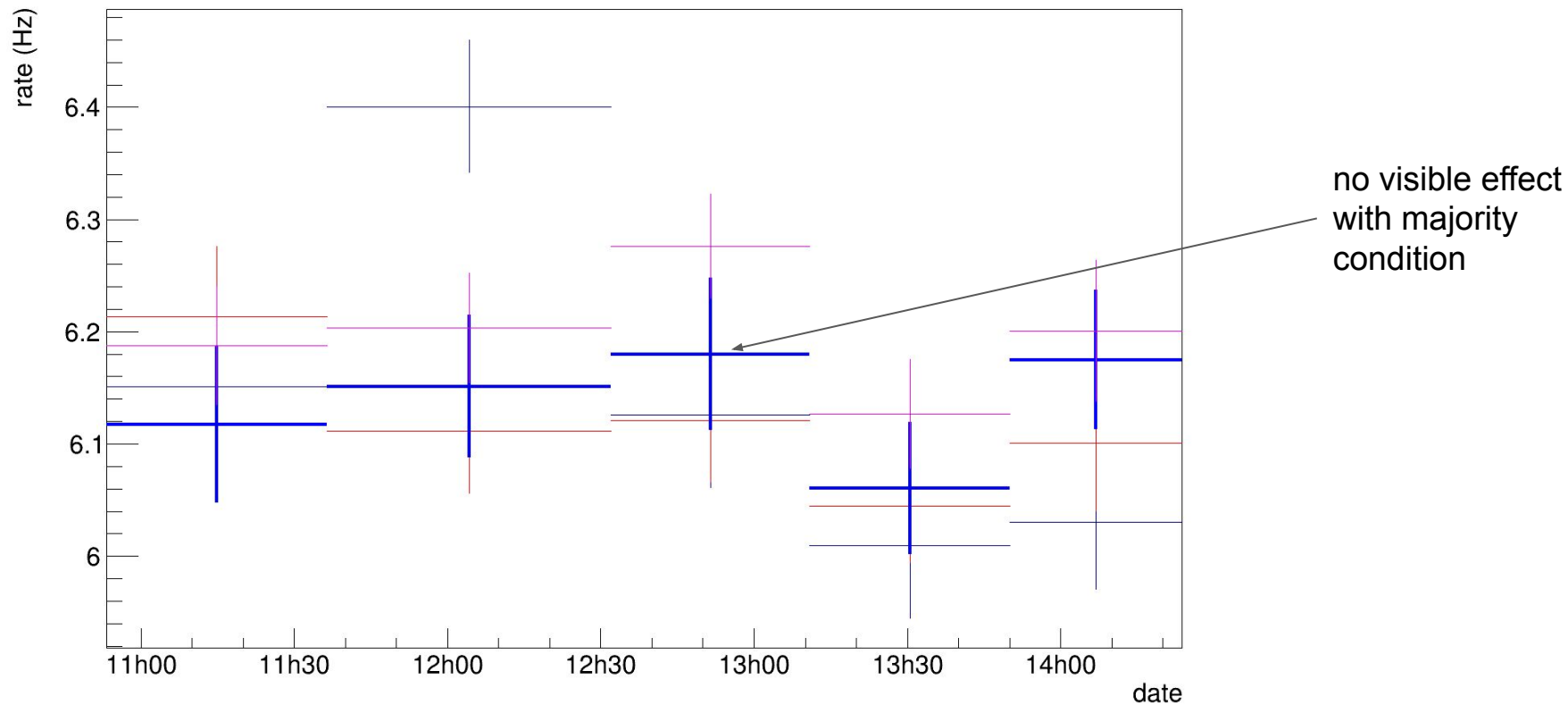
Effect on efficiency for vertical pair with **4 AND**



Rate of vertical pair when requiring **4-AND**

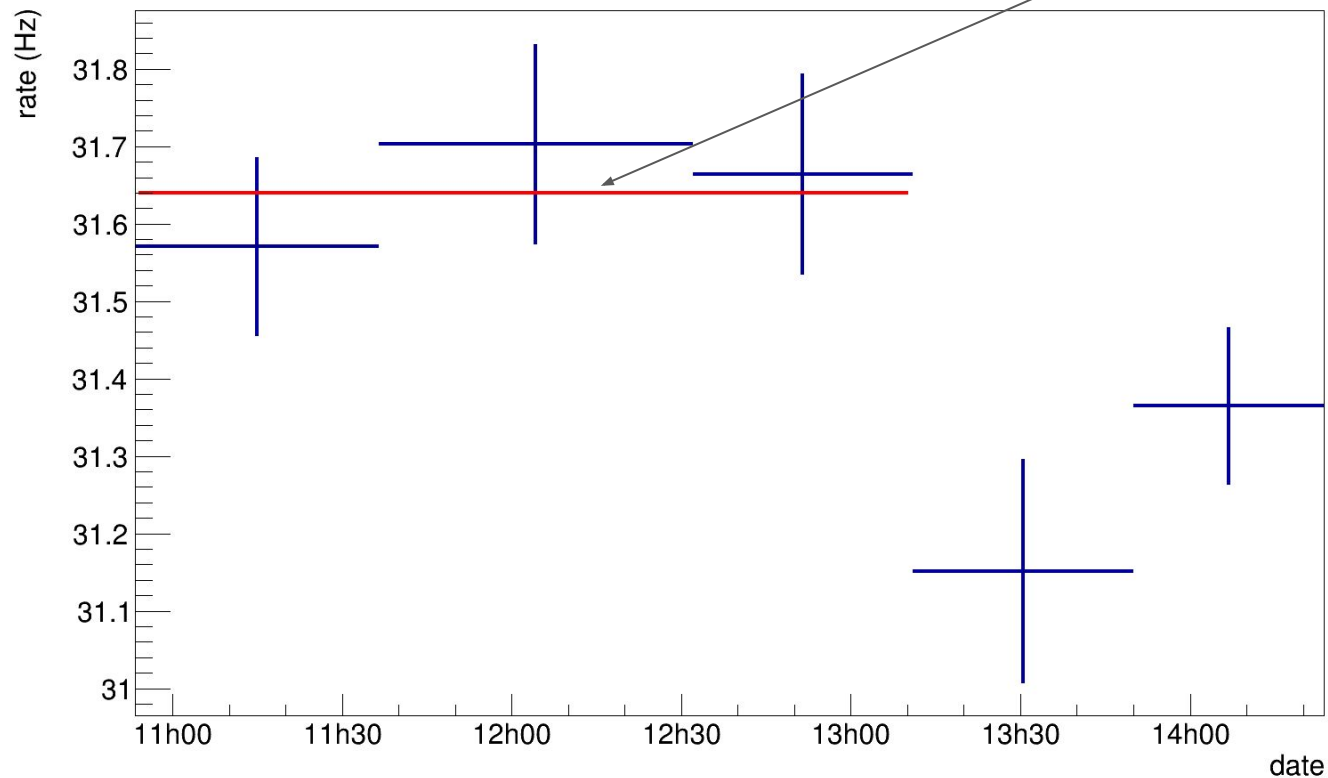


Rate of vertical pair when requiring **majority** (default)

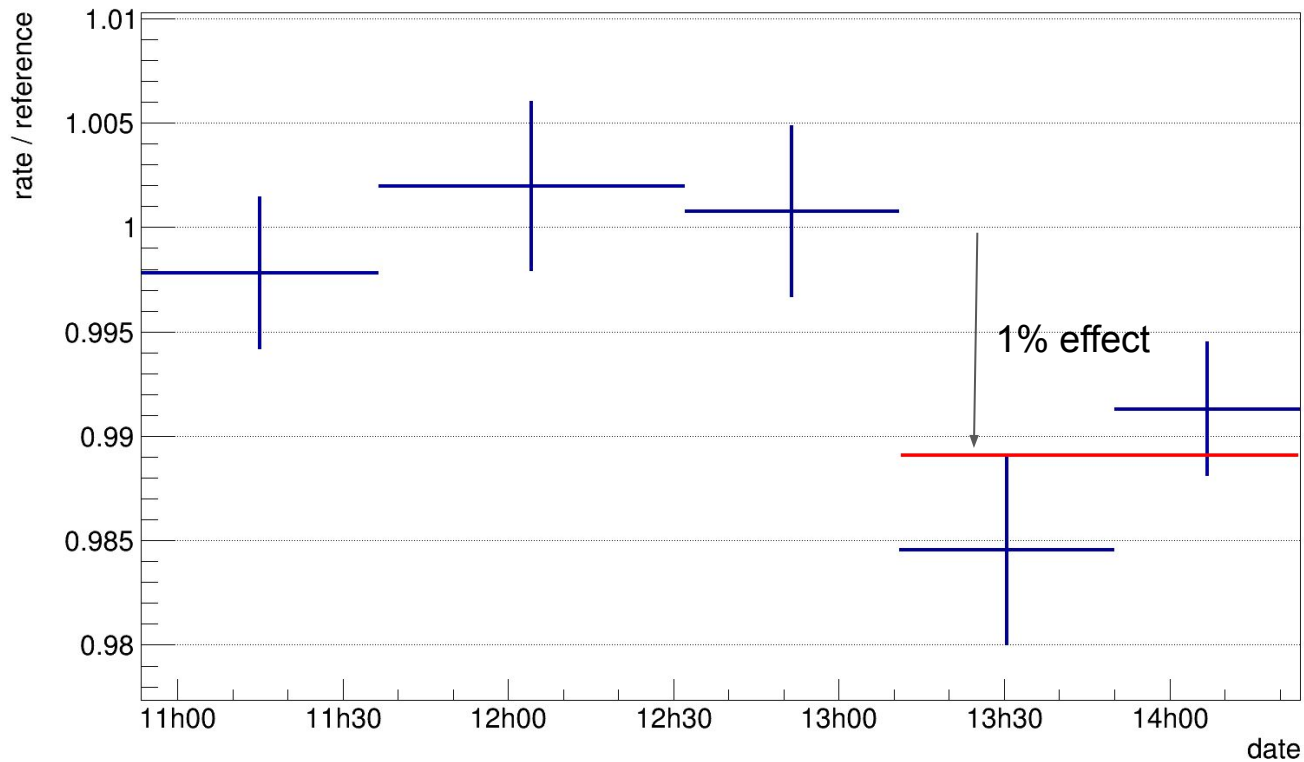


Total rate (majority)

reference = 31.64 Hz



Shielding effect on last 2 runs



Source	Details	Magnitude of relative uncertainty
Efficiency	Rate from different scintillator tile pairs	0.4-0.7%
Daily fluctuations	Latitude $> 60^\circ$	0.5%
Pressure corrections	Varied by $\pm 10\%$	0.5%
Altitude	Depending on the altitude	0.2% at 500 m
Inclination	Varied by $\pm 10\%$	negligible
Seasonal effect	Modulation amplitude $\pm 10\%$, peak position ± 1 week	0.25%
Total syst. error		0.8%-1%

Material

No Lampedusa, Cosenza, Svalbard

1%

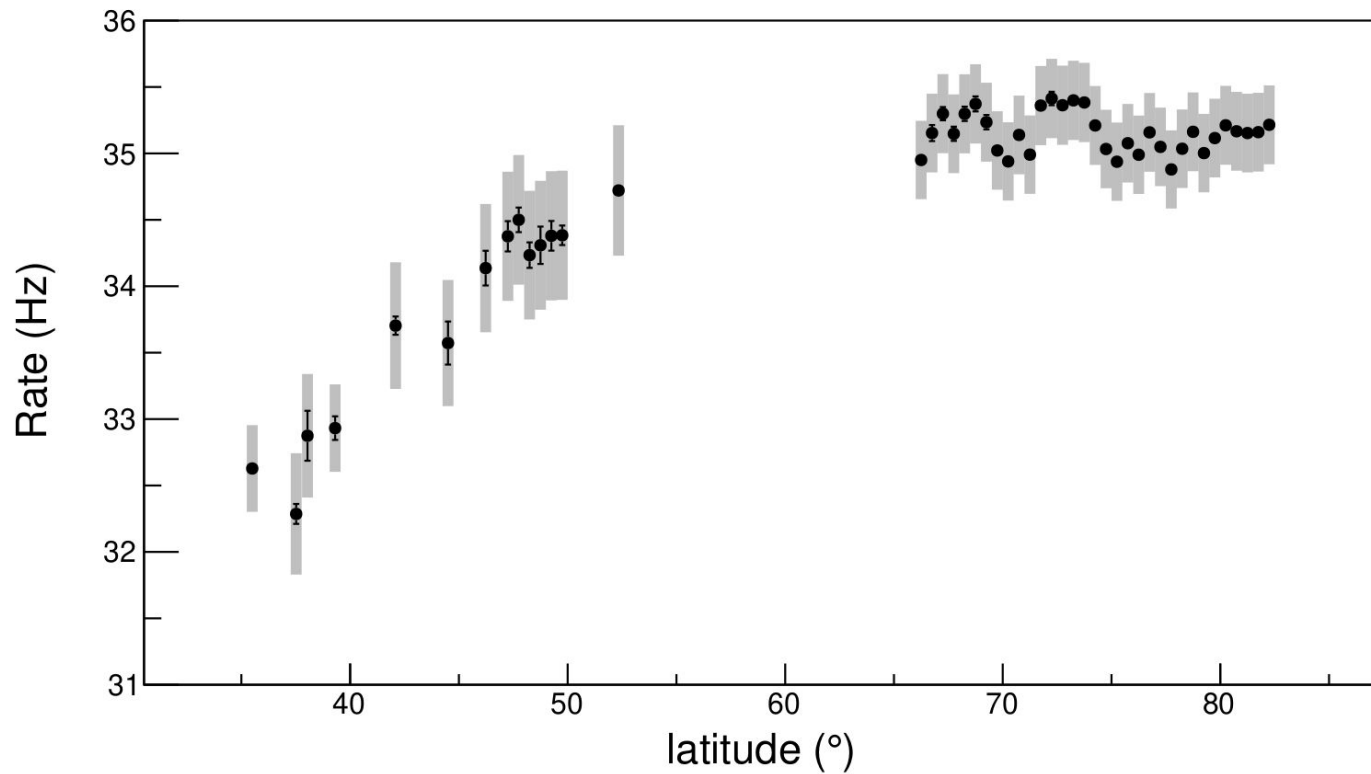
The measurements

Table 1: The different places where POLA-01 took data.

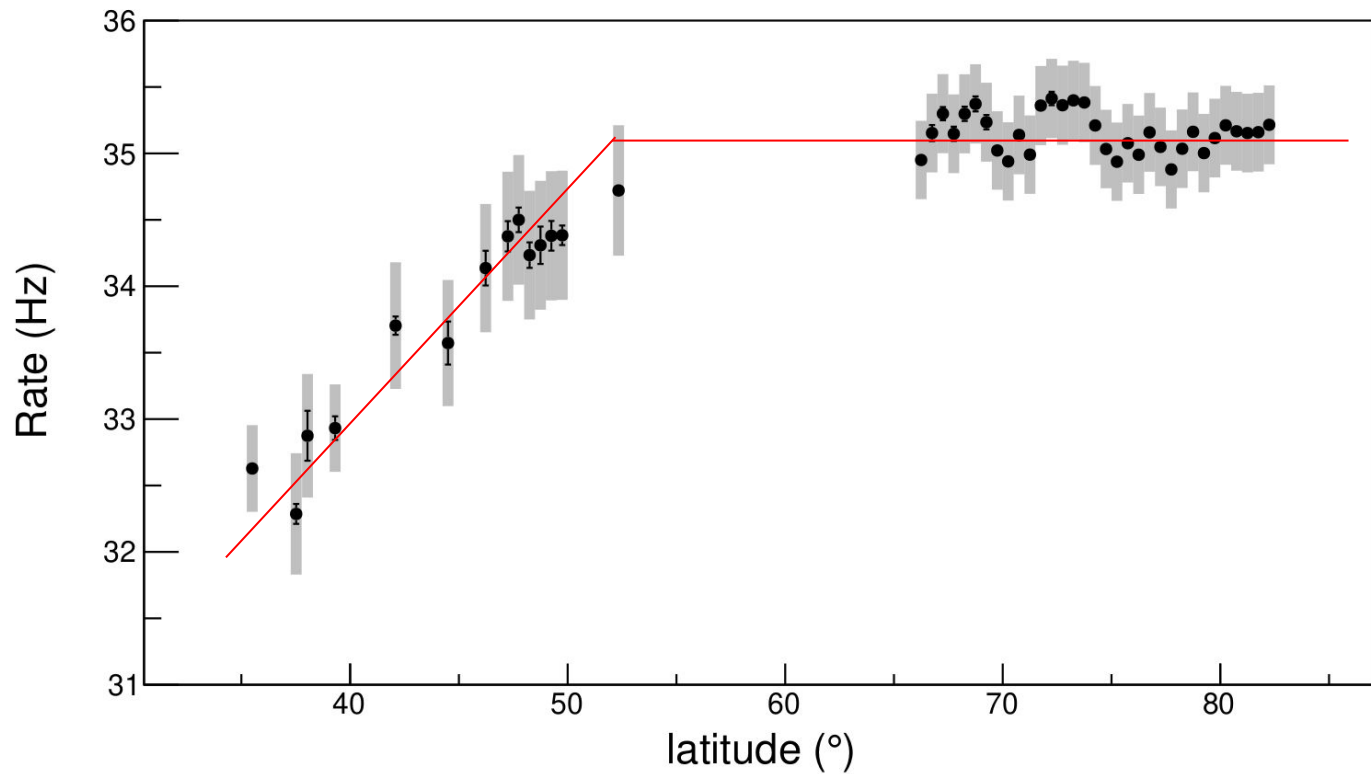
Place	Period	Latitude (°)	Altitude (m)
<i>CERN</i>	26/06/18 - 28/06/18	46.23	441
<i>Nanuq</i>	21/07/18 - 05/09/18	66.82	0
<i>Vigna di Valle</i>	27/11/18	42.1	153
<i>Cosenza</i>	04/12/18 - 05/12/18	39.3	222
<i>Cefalù</i>	06/12/18	38.0	0
<i>Catania</i>	31/01/19	37.5	158
<i>Lampedusa*</i>	07/03/19 - 08/03/19	35.5	10
<i>Bologna</i>	08/04/19	44.5	81
<i>Bologna-Hannover</i>	10/04/19	44.6-51.0	200-700
<i>Hannover-Frankfurt</i>	11/04/19	52.3	60
<i>Frankfurt-Geneva</i>	12/04/19	50.0-46.0	100-500

* The island of Lampedusa was reached from Sicily by ferry boat; measurements were only performed on the island

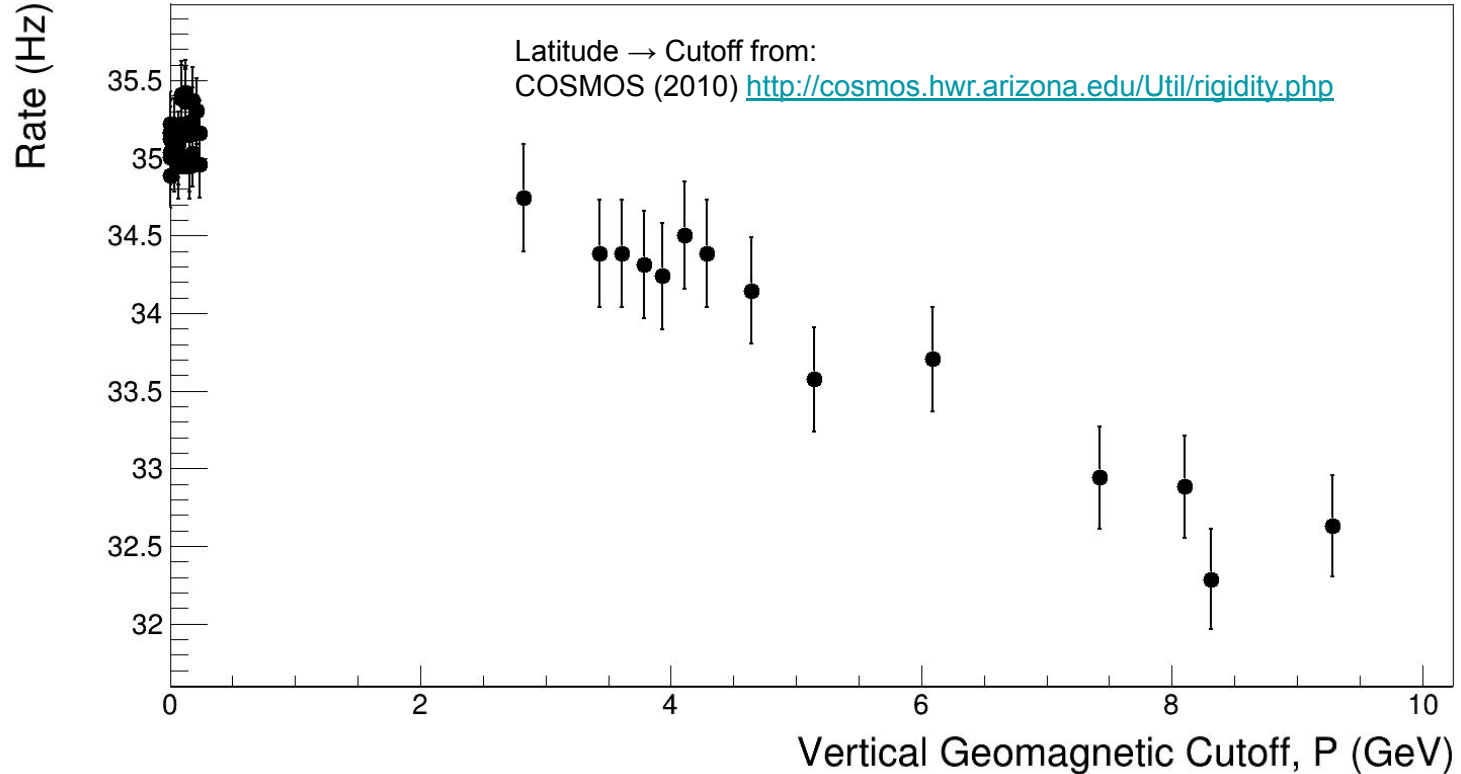
Final plot



Final plot



Vertical Geomagnetic Cutoff



backup

Reference Pressure = 1011.85 mbar and Barometric coeff = 0.0022 mbar^-1

lat	rate(Hz)	stat_err	syst_err	syst_err(%)
35.50	32.628076	0.045431	0.326281	1.0
37.52	32.286154	0.074995	0.456595	1.4
38.04	32.874493	0.188021	0.464916	1.4
39.31	32.931999	0.088880	0.329320	1.0
42.09	33.703533	0.068920	0.476640	1.4
44.50	33.572346	0.162192	0.474785	1.4
46.23	34.136431	0.130672	0.482762	1.4
47.25	34.376024	0.114004	0.486150	1.4
47.75	34.499848	0.092487	0.487902	1.4
48.25	34.234242	0.096053	0.484145	1.4
48.75	34.308410	0.140647	0.485194	1.4
49.25	34.379726	0.111709	0.486203	1.4
49.75	34.383710	0.073574	0.486259	1.4
52.34	34.721041	0.040829	0.491030	1.4
66.25	34.950444	0.016499	0.294728	0.8
66.75	35.153267	0.060448	0.296438	0.8
67.25	35.299167	0.049936	0.297669	0.8
67.75	35.147848	0.053534	0.296393	0.8
68.25	35.298070	0.054041	0.297659	0.8
68.75	35.372602	0.056547	0.298288	0.8
69.25	35.235019	0.054192	0.297128	0.8
69.75	35.022029	0.015838	0.295332	0.8
70.25	34.939763	0.013671	0.294638	0.8
70.75	35.139040	0.035291	0.296318	0.8
71.25	34.990728	0.025564	0.295068	0.8
71.75	35.360140	0.036588	0.298183	0.8
72.25	35.413417	0.050678	0.298632	0.8
72.75	35.362779	0.035775	0.298205	0.8
73.25	35.399268	0.037554	0.298513	0.8
73.75	35.383439	0.042594	0.298379	0.8
74.25	35.210461	0.023843	0.296921	0.8
74.75	35.033082	0.034080	0.295425	0.8
75.25	34.937474	0.038777	0.294619	0.8
75.75	35.076636	0.031888	0.295792	0.8
76.25	34.989962	0.027334	0.295061	0.8
76.75	35.158384	0.015434	0.296482	0.8
77.25	35.049133	0.015688	0.295560	0.8
77.75	34.879284	0.016143	0.294128	0.8
78.25	35.035081	0.009535	0.295442	0.8
78.75	35.162543	0.015612	0.296517	0.8
79.25	35.002338	0.017923	0.295166	0.8
79.75	35.115429	0.021959	0.296119	0.8
80.25	35.211505	0.015276	0.296929	0.8
80.75	35.166498	0.015722	0.296550	0.8
81.25	35.153103	0.032432	0.296437	0.8
81.75	35.159830	0.032740	0.296494	0.8
82.25	35.215259	0.046318	0.296961	0.8