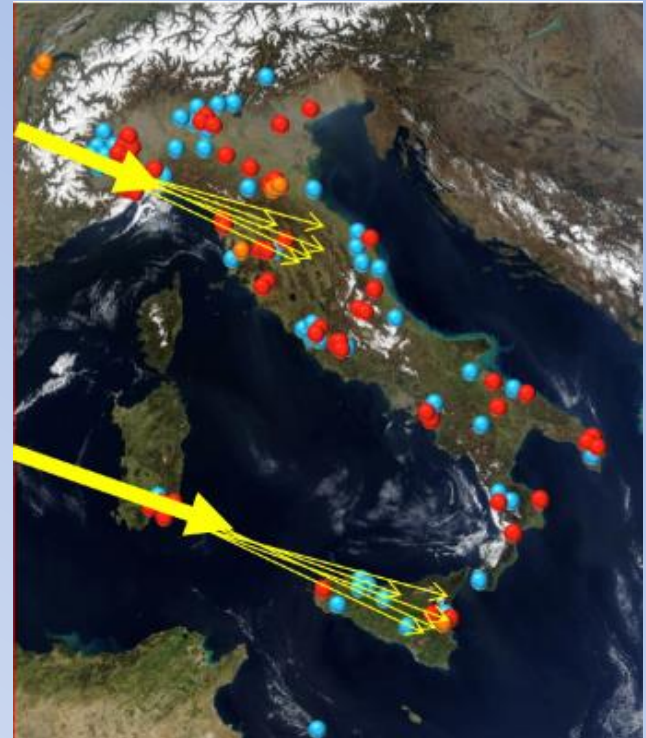


STATUS REPORT ON LDC ANALYSIS AND MULTI-TRACK EVENTS

Paola La Rocca



A BRIEF SUMMARY

Analysis strategy: correlations between two and multi-track events in both telescopes

Pre - selection of multi-track events:

- $\text{Chi}^2 < 50$
- Parallelism constrain (scalar product with the seed track > 0.8)

Data set:

No. of telescopes: 39 telescopes + 5 clusters

No. of Events: 50 millions of events

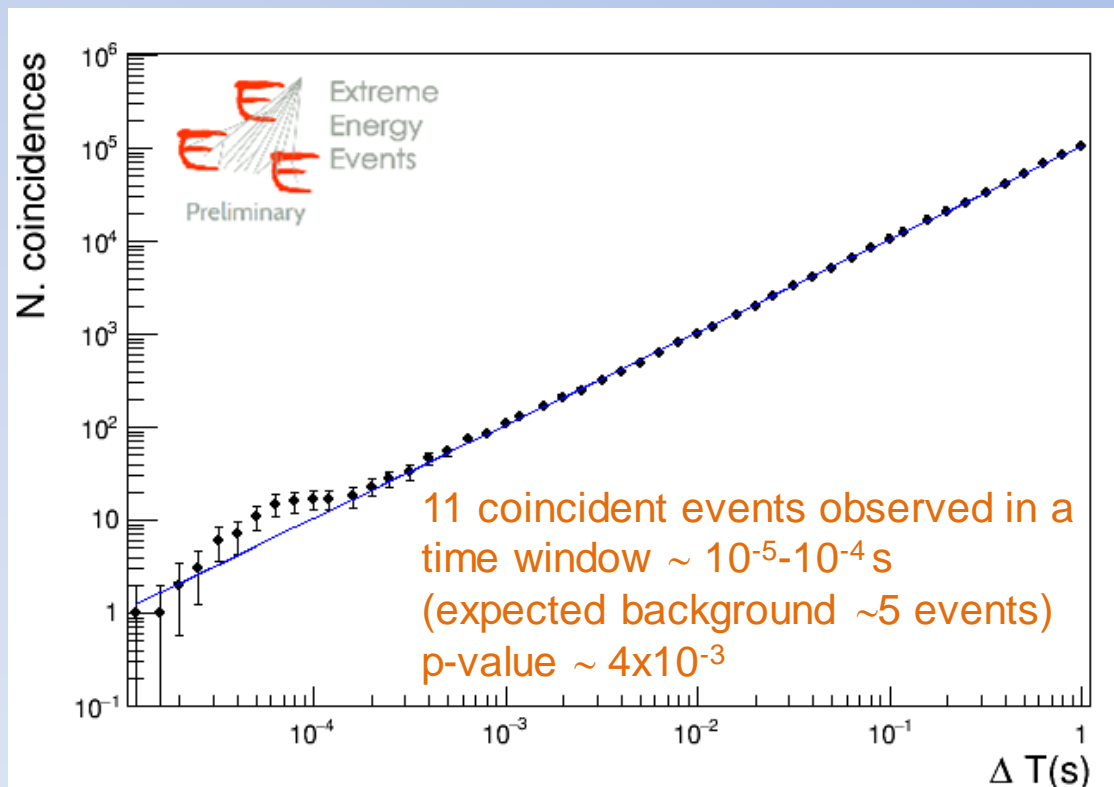
Period: 2016-01-01 → 2018-03-26 (816 days)

Analysis cuts:

- Telescope distance > 5 km
- Ntracks > 4 on both telescopes

A BRIEF SUMMARY

Analysis strategy: correlations between two and multi-track events in both telescopes



A BRIEF SUMMARY

Analysis strategy: correlations between two and multi-track events in both telescopes

Event	EEE pairs	$n_{tracks1}$	$n_{tracks2}$	Distance (km)	$\theta_{rel}(deg)$	Date
(A)	CERN-BOLOGNA	7	5	456	21	January 2016
(B)	L'AQUILA-BOLOGNA	7	6	290	41	April 2016
(C)	CERN-CATANZARO	5	7	1194	18	May 2016
(D)	L'AQUILA-TORINO	5	5	551	23	May 2016
(E)	LODI-SAVONA	5	5	137	24	October 2016
(F)	FRASCATI-REGGIO EMILIA	5	5	361	71	December 2016
(G)	CAGLIARI-LODI	6	5	675	50	January 2017
(H)	CERN-PATERNÒ	5	5	1208	41	March 2017
(I)	BOLOGNA-CATANZARO	6	5	767	36	March 2017
(J)	L'AQUILA-LECCE	6	5	456	64	June 2017
(K)	BOLOGNA-SAVONA	5	5	229	24	October 2017

Nucl. Phys. B Proc. Suppl.
(Proceeding for CRIS2018 Conference)

MULTI-TRACK EVENTS

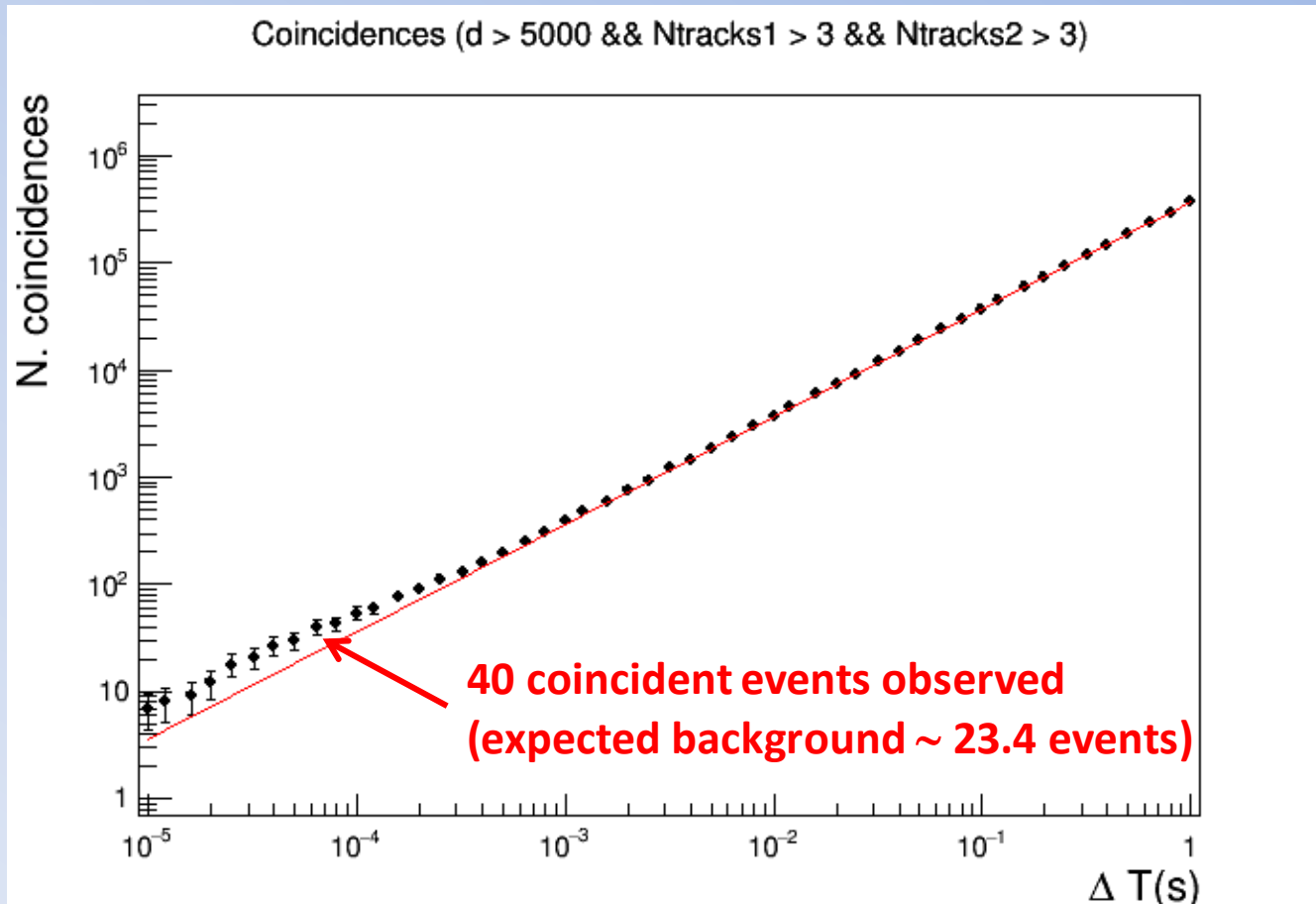
In order to investigate multi-tracks events:

- data reprocessed
- more stringent cut on tracks $\chi^2 (<10)$
- additional info saved in the analysis tree **Thanks to Francesco N.!**
 - Direction cosines of the tracks
 - χ^2 of the tracks
 - Sum of the scalar products between tracks (degree of alignment)

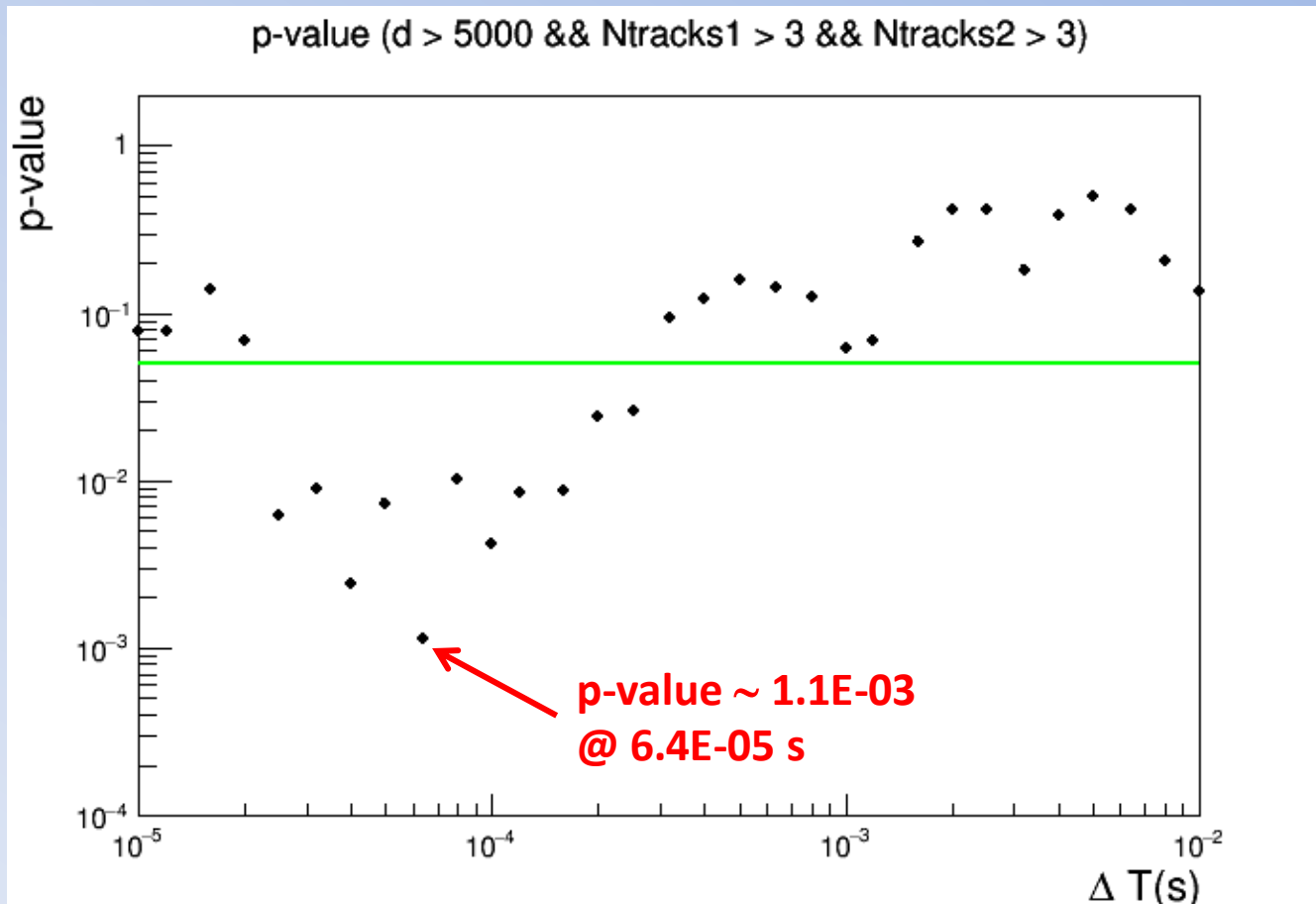
Data set available:

- 3×10^7 coincident events (in ± 2 seconds window)
- Full statistics (2013 -> 2018)
- 42 telescopes + 5 clusters

CUT ON NTRACKS

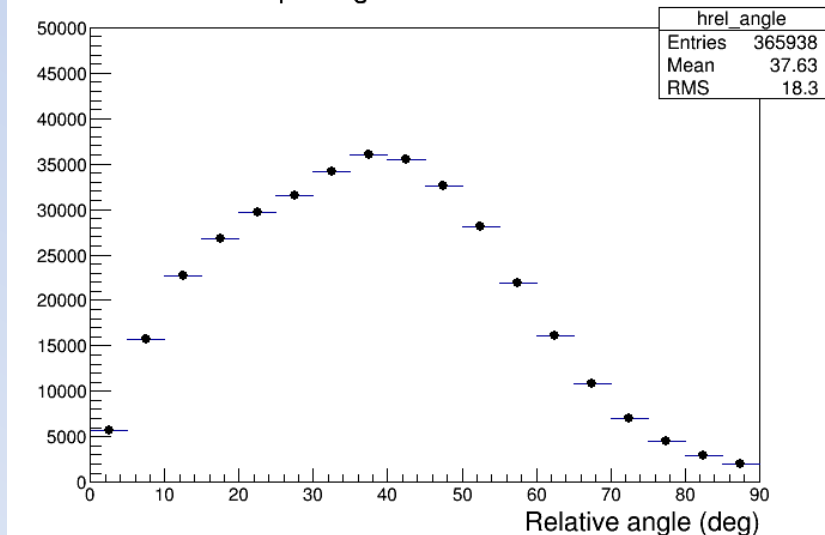


CUT ON NTRACKS

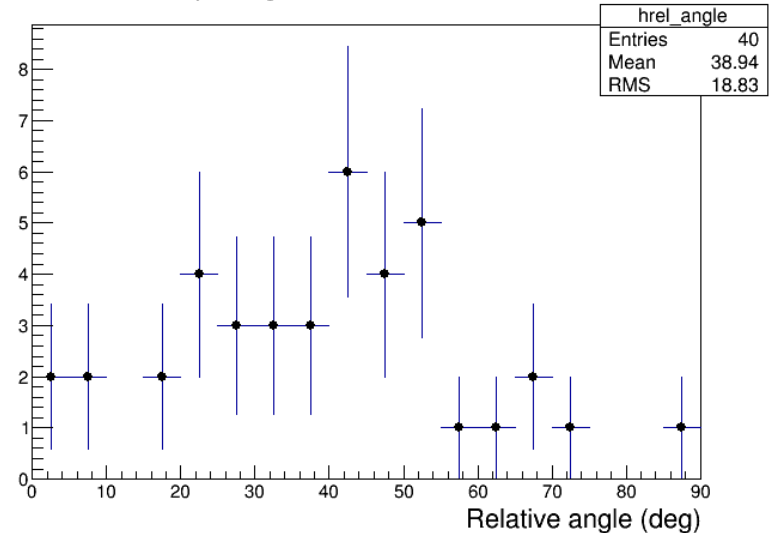


STUDY OF THE RELATIVE ANGLE

Relative phi angle distribution in 1 second

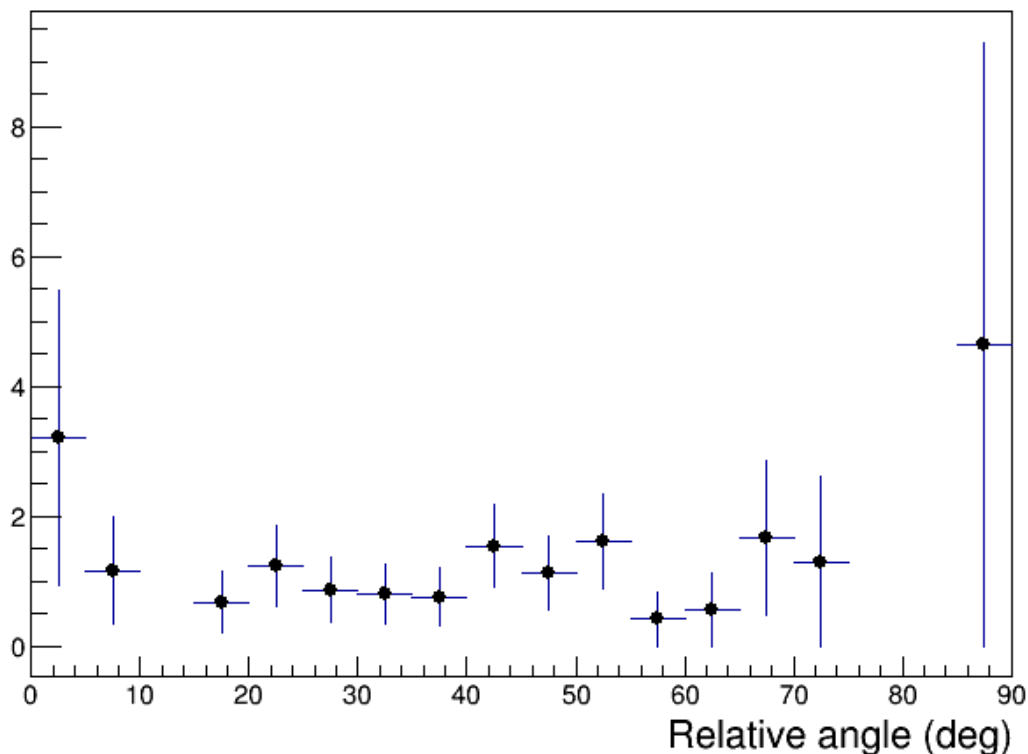


Relative phi angle distribution in 6.4E-05 second



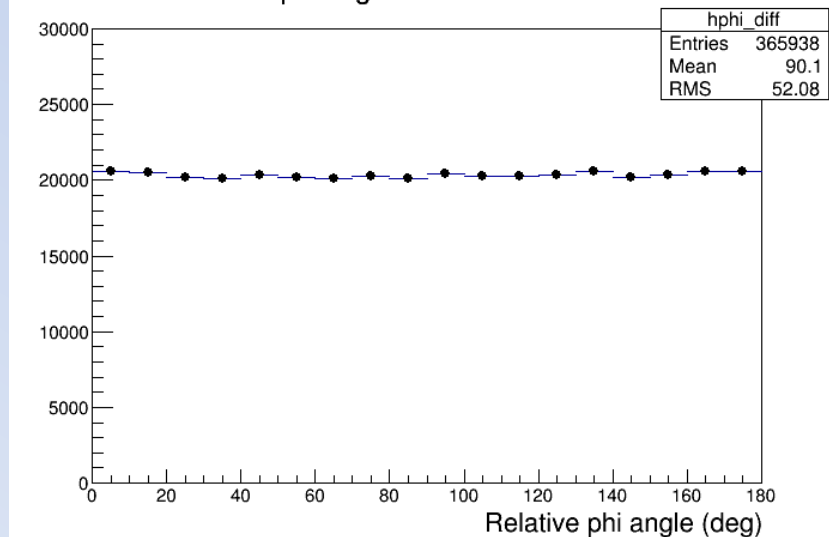
STUDY OF THE RELATIVE ANGLE

Ratio between histos (1,6E-05 s/ 1 s)

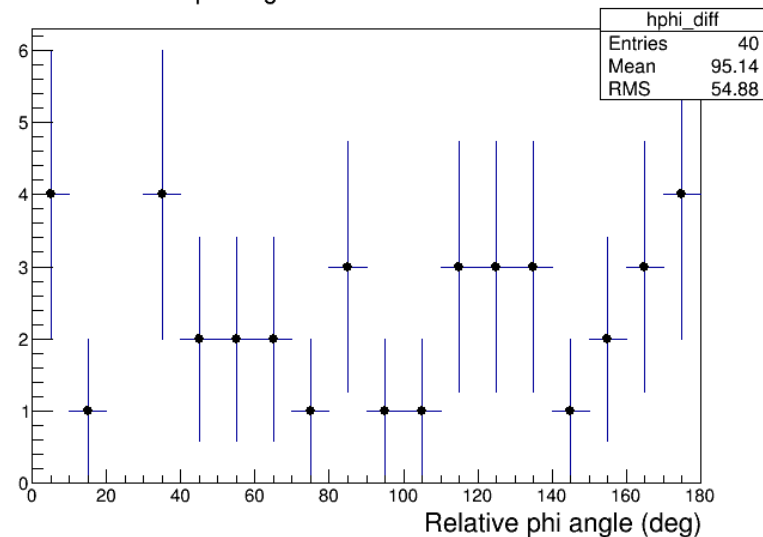


STUDY OF THE RELATIVE ANGLE

Relative phi angle distribution in 1 second

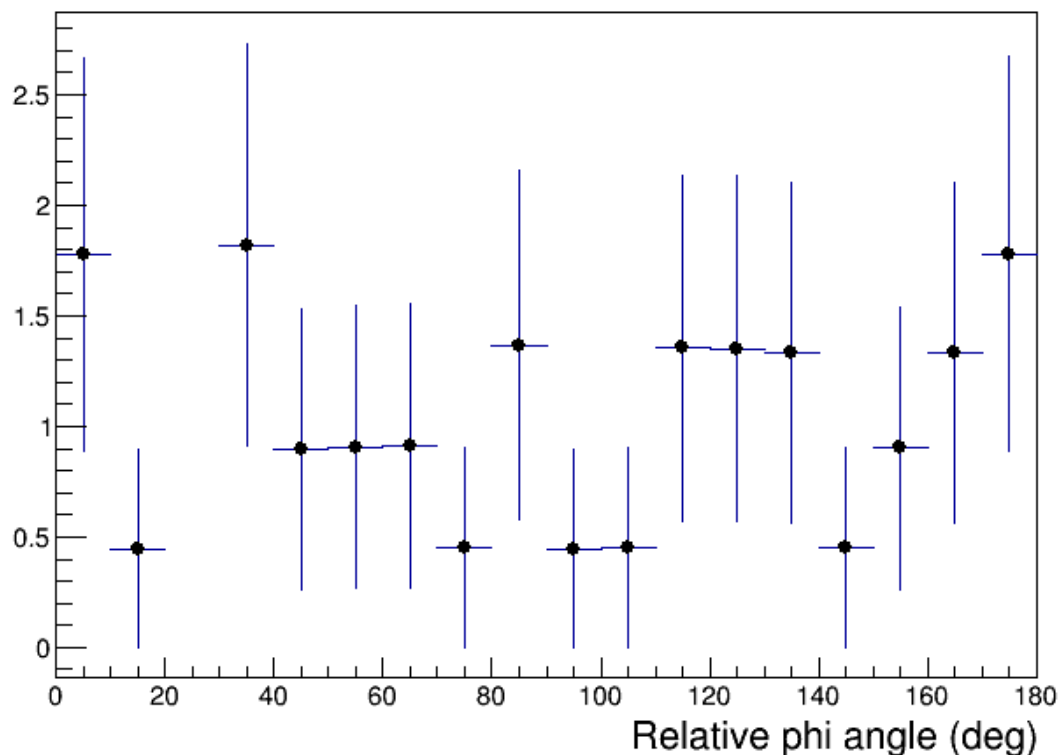


Relative phi angle distribution in 6.4E-05 second

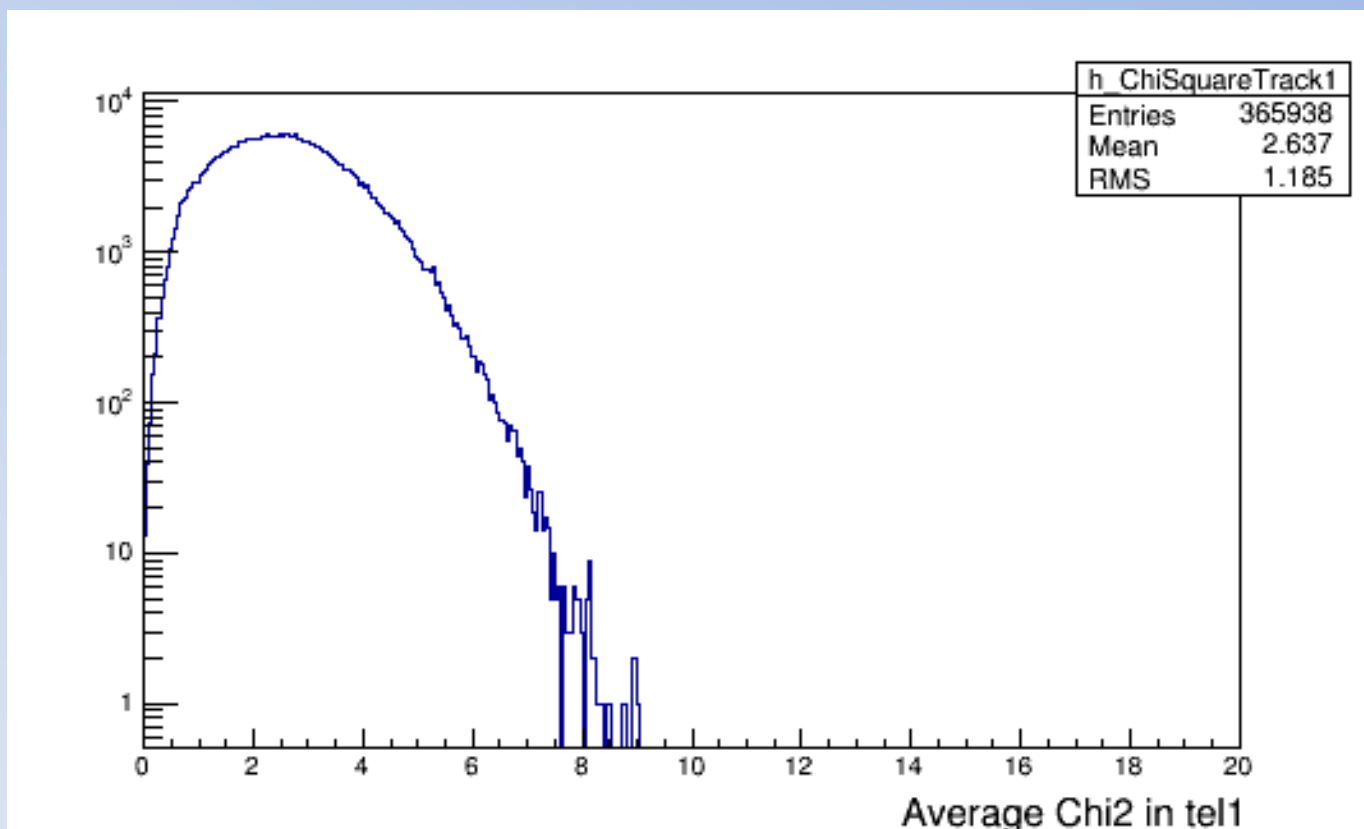


STUDY OF THE RELATIVE ANGLE

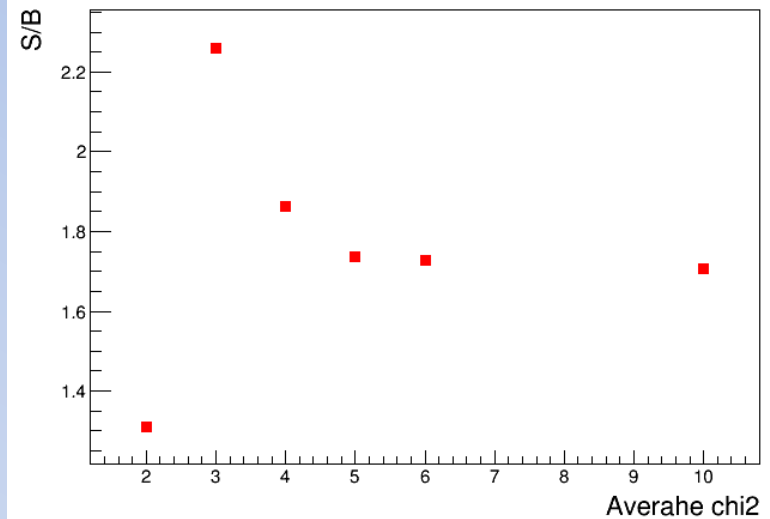
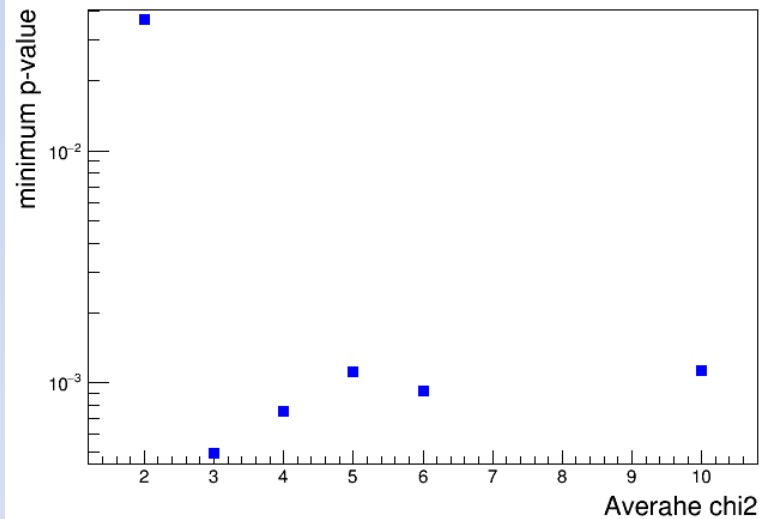
Ratio between phi histos ($1,6E-05$ s/ 1 s)



CUT ON AVERAGE CHI2



CUT ON AVERAGE CHI2



CONCLUSIONS AND OUTLOOK

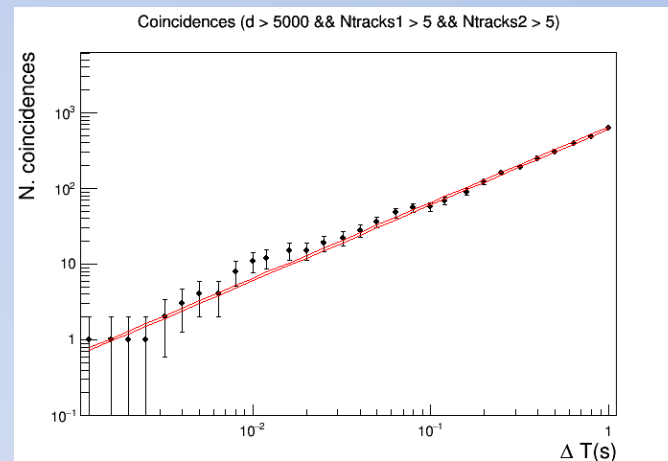
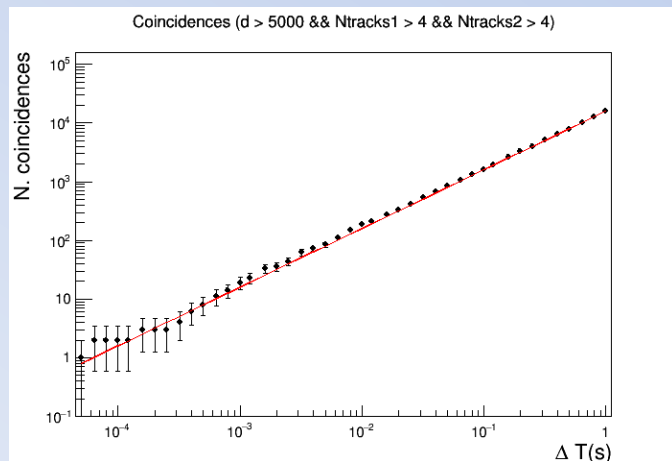
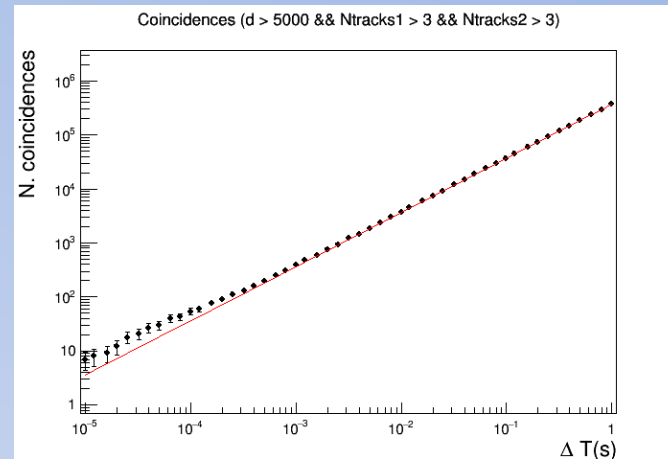
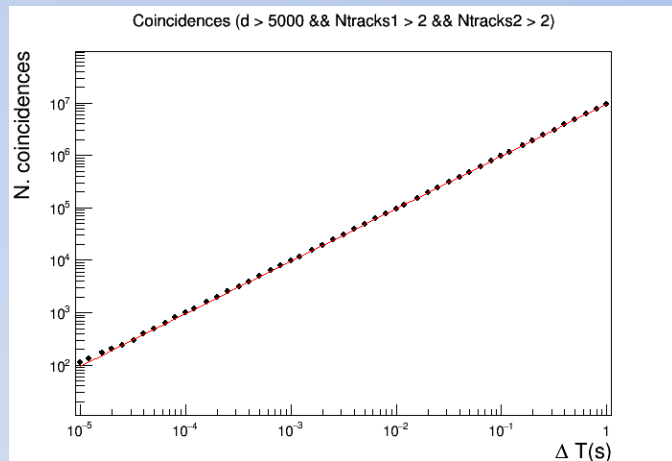
- **Small excess observed for $\Delta T \sim 10^{-5} - 10^{-4}$ s**
- **This excess survives additional cuts on average χ^2**
- **No particular angular correlation was observed between average directions reconstructed by the 2 telescopes**
- **Need to study the parallelism of the tracks in each telescope**

EEE MEETING

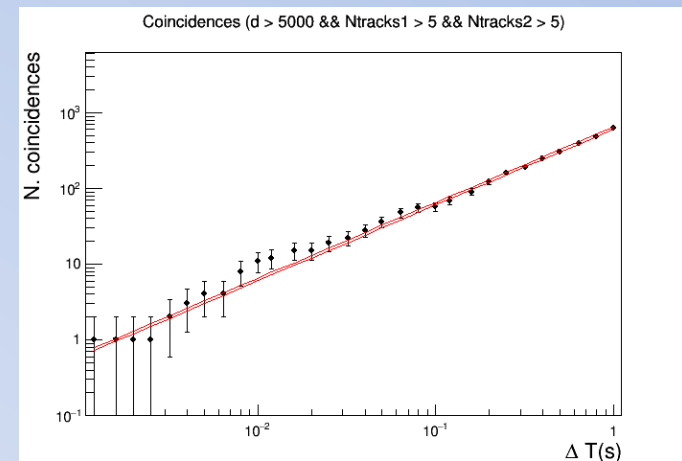
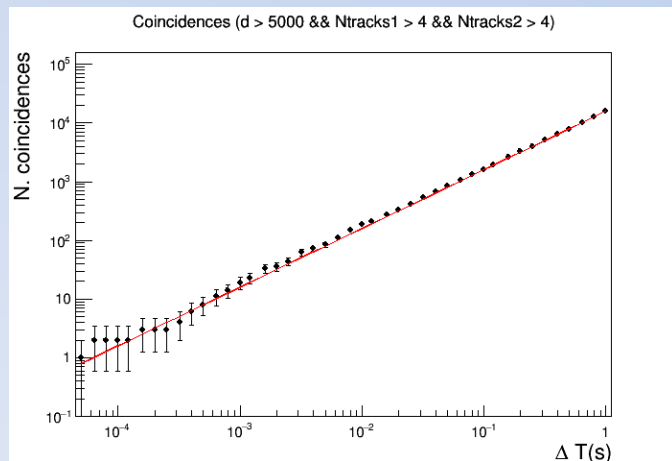
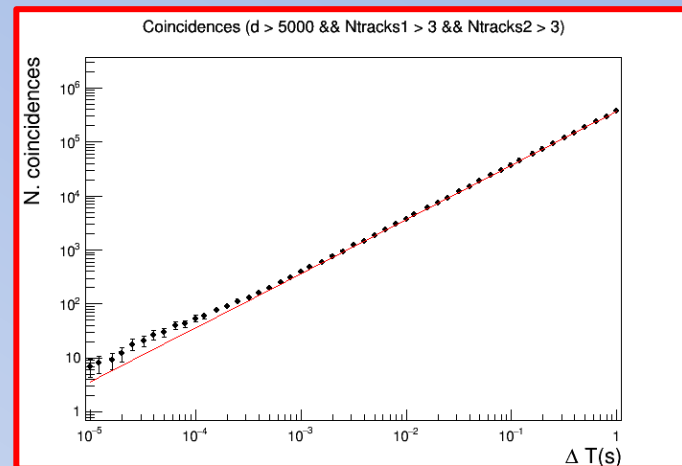
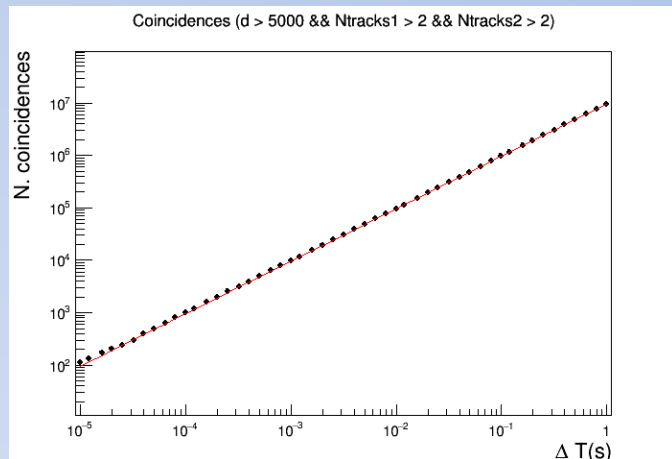
Turin – March 6, 2019

BACKUP SLIDES

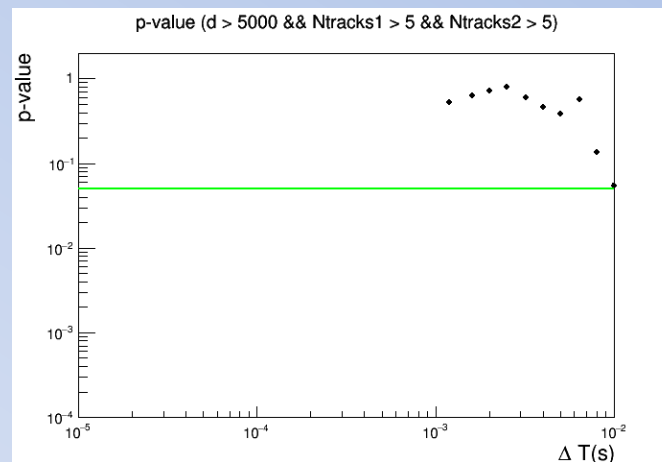
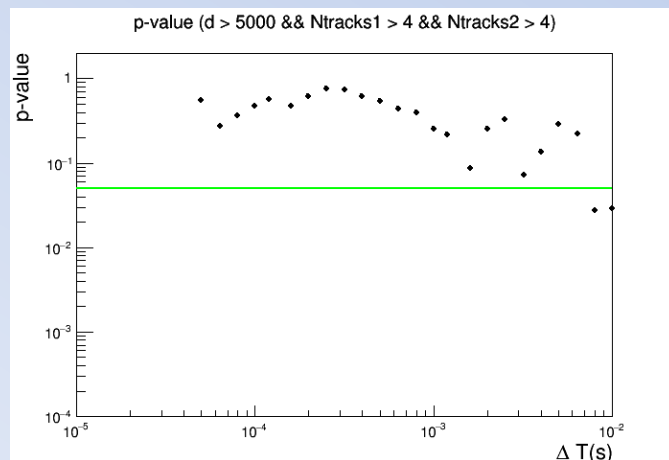
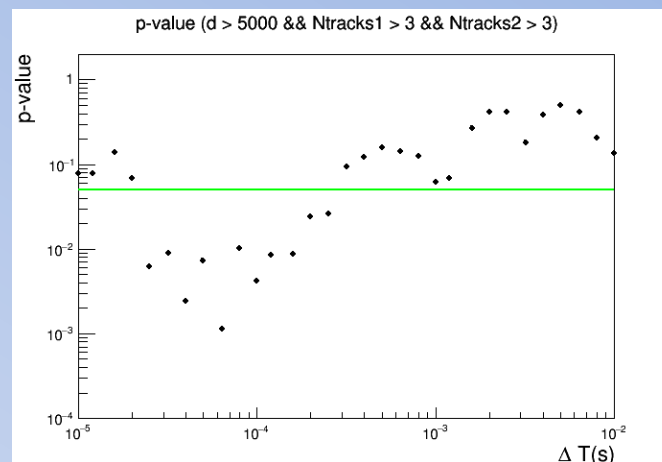
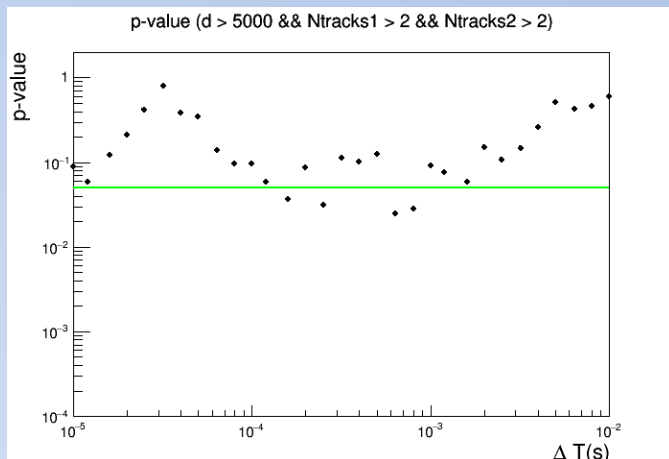
CUT ON NTRACKS



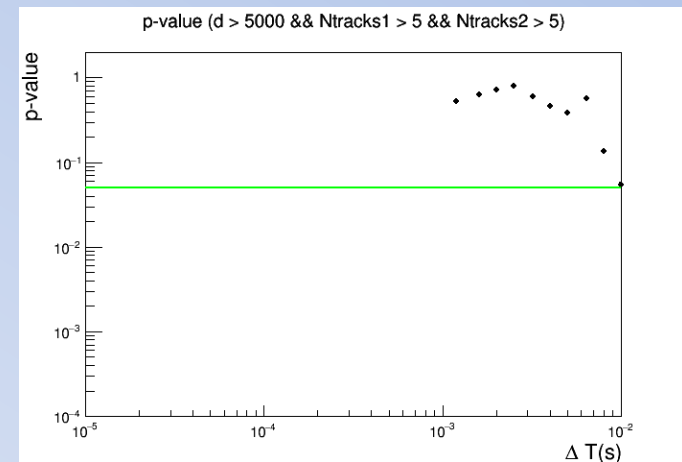
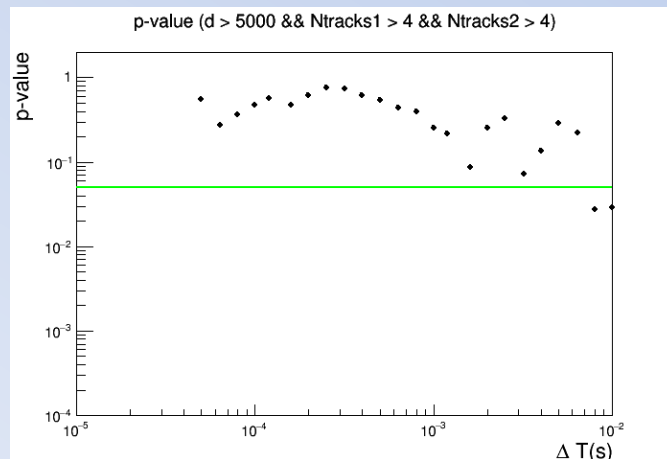
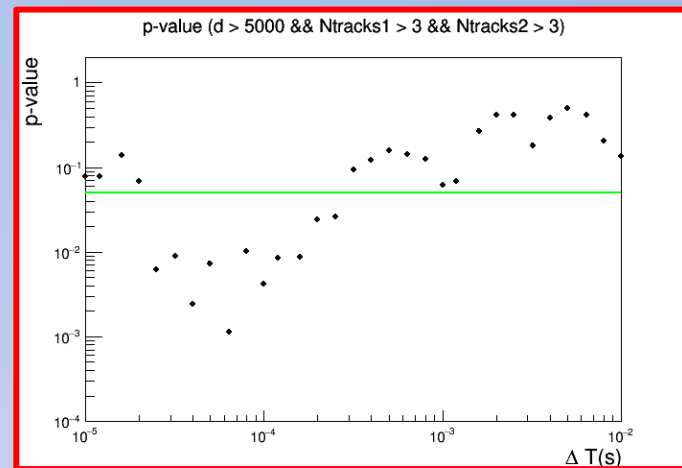
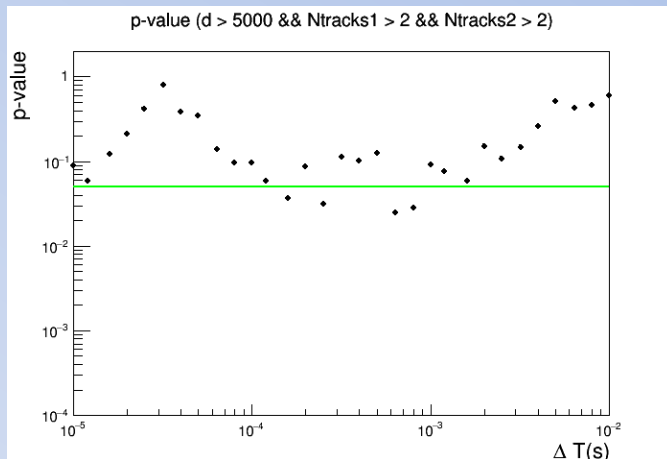
CUT ON NTRACKS



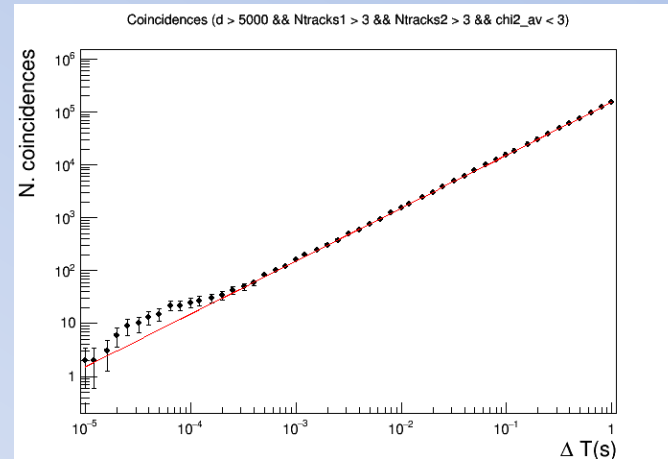
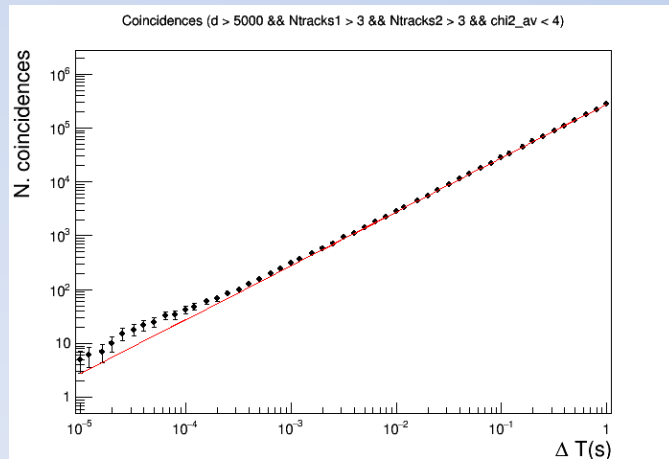
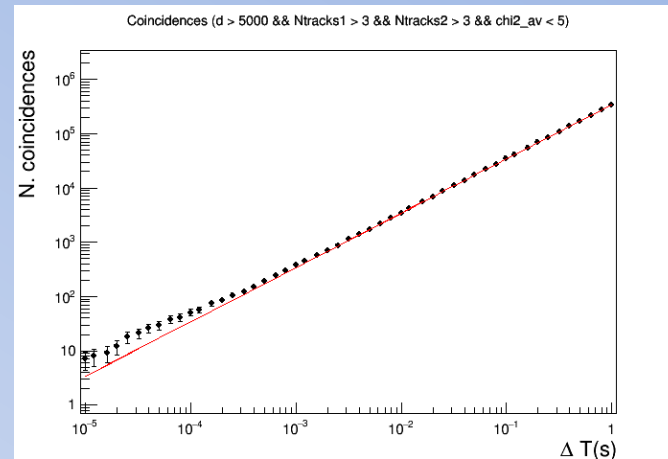
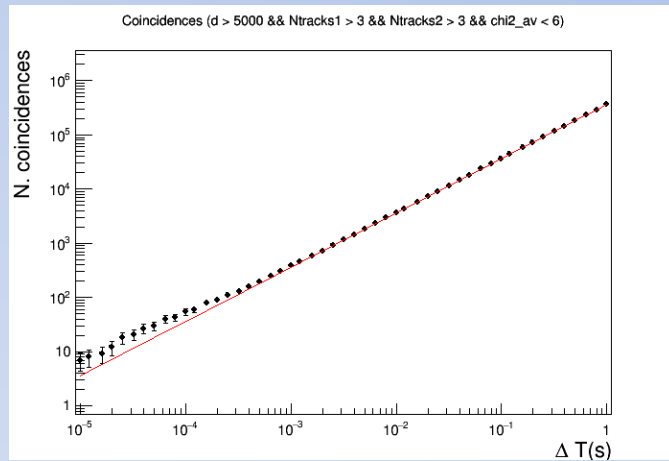
CUT ON NTRACKS



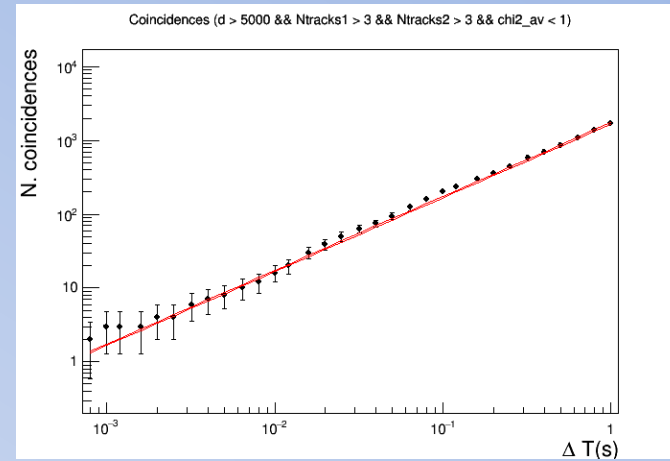
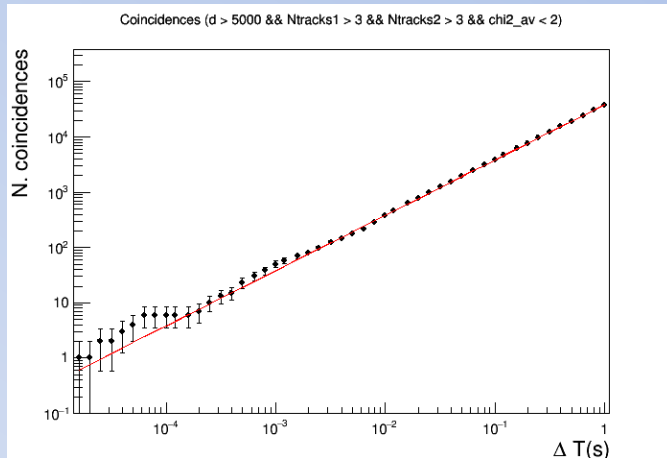
CUT ON NTRACKS



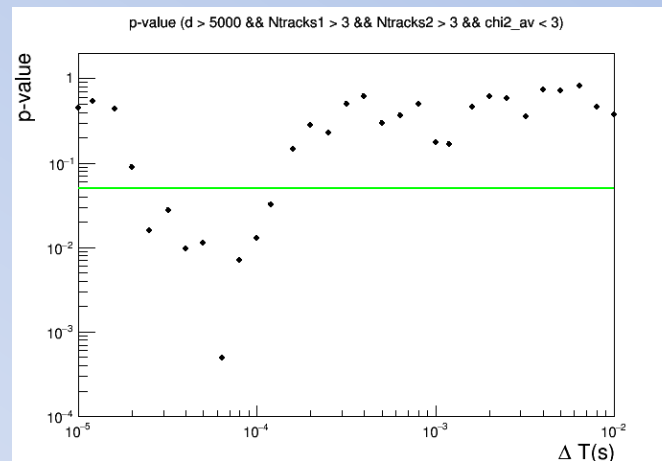
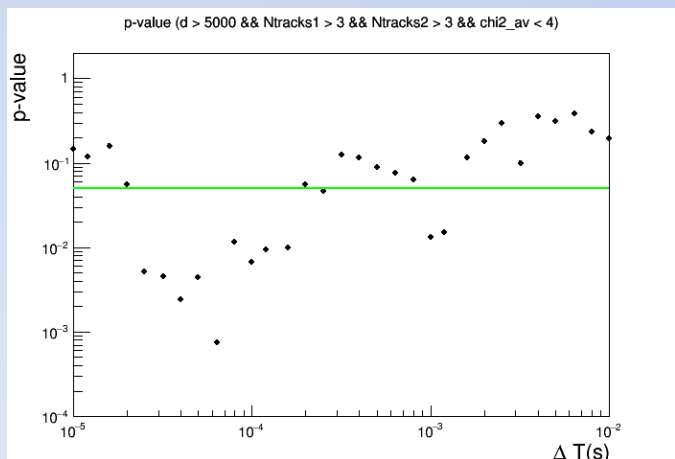
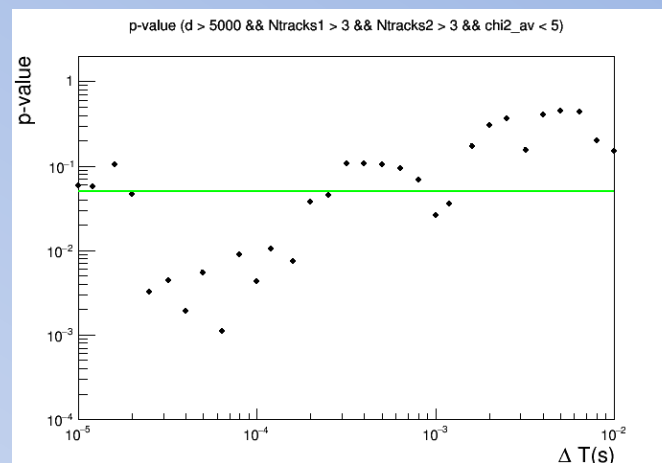
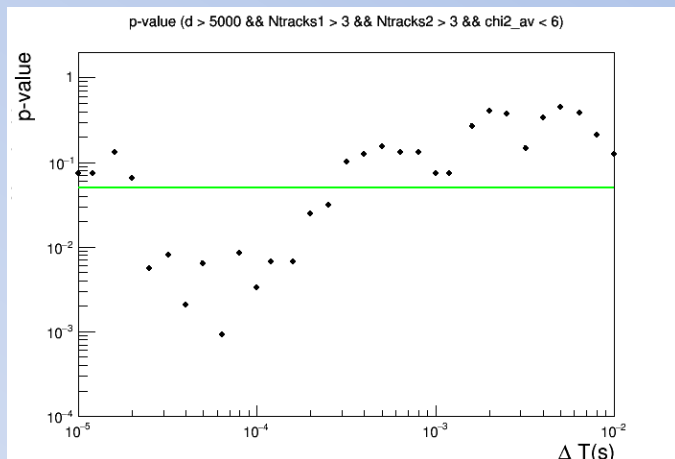
CUT ON AVERAGE CHI2



CUT ON AVERAGE CHI2



CUT ON AVERAGE CHI2



CUT ON AVERAGE CHI2

