Coplanarity/elastic with the TOF ONLY (updated analysis)

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OLYMPUS Collaboration meeting, April 12-13 2012, DESY, Hamburg

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- 2D plots: ADC gain vs. meantime difference
- Cuts used for analysis
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Fitting procedure, 2D plots

Based on latest cosmic run data the fitting procedure was performed to get the meantime offsets. In general 33 offsets for various bars were determined relative to L1, for which a common zero offset was assigned. The PMTs L4 and R4 were not operating, therefore for them also a zero offset was assigned.

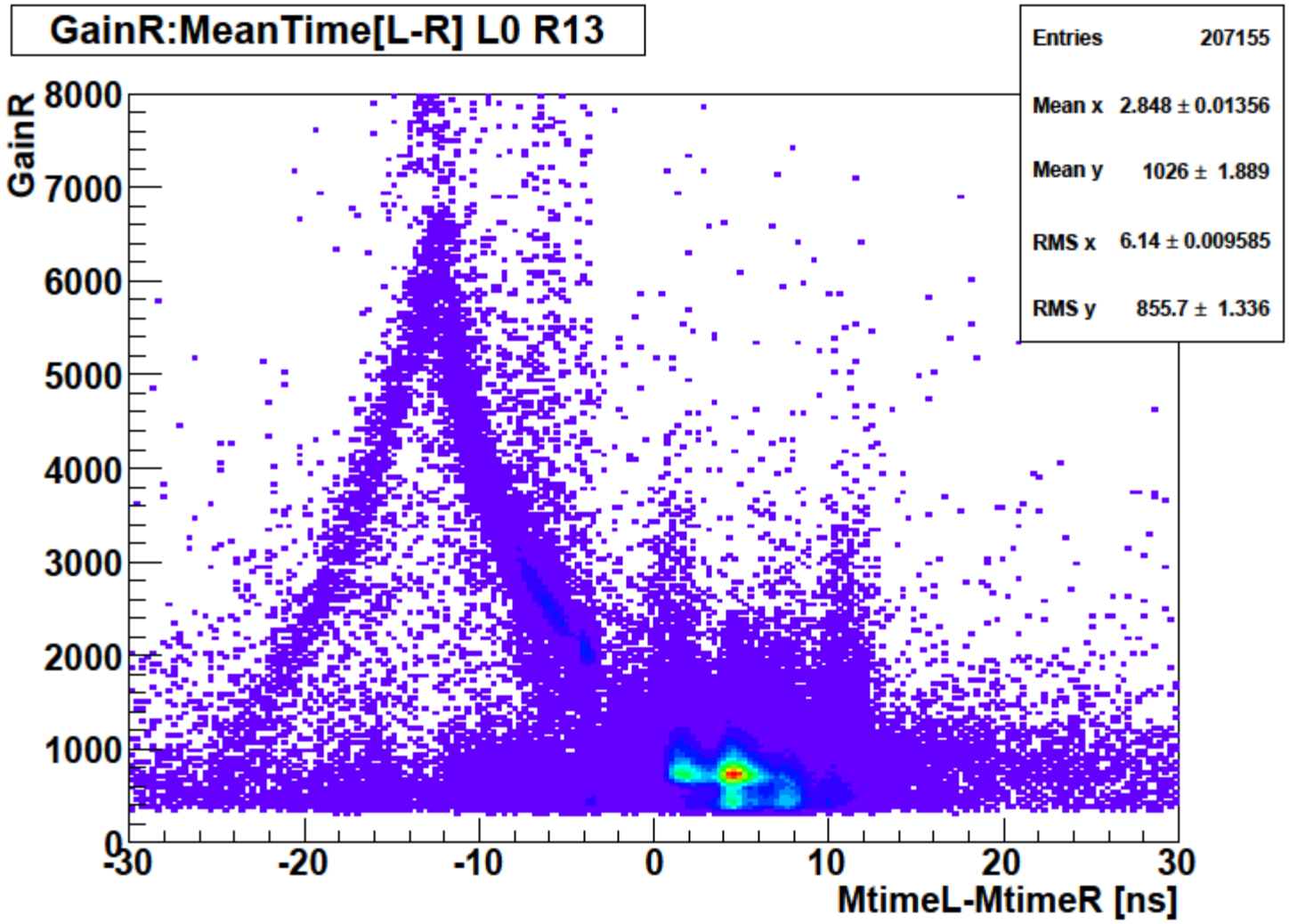
The ADC gain for each bar was determined as:

$$G = \sqrt{G_{TOP} * G_{BOT}}$$

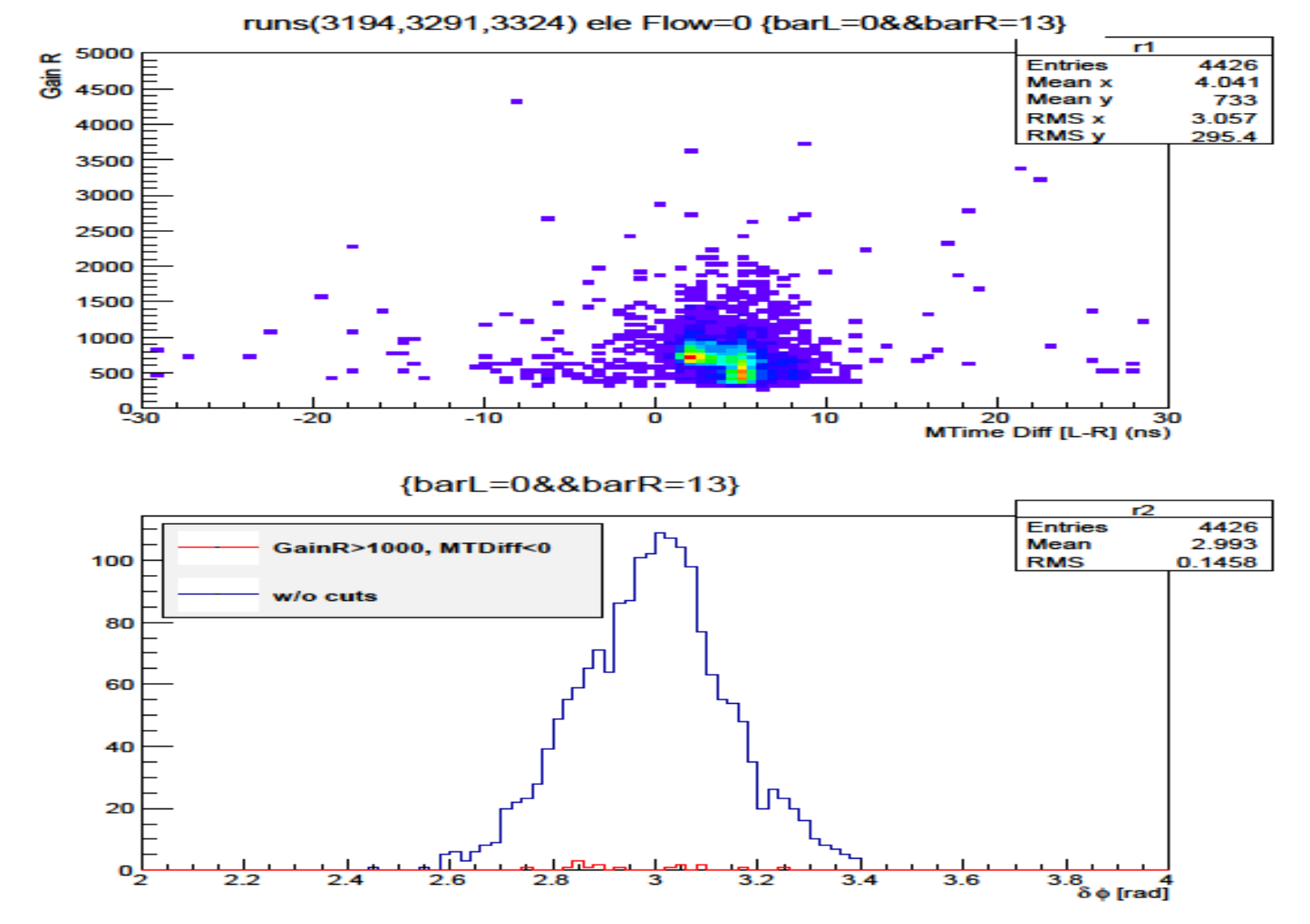
The meantime difference for each bars combination (I, j) was determined like:

$$MT^{i}_{Left} - MT^{i}_{Right} = \left(TDC^{i}_{TOP} + TDC^{i}_{BOT} - offset^{\,i}\right)^{Left} - \left(TDC^{j}_{TOP} + TDC^{j}_{BOT} - offset^{\,j}\right)^{Right}$$

2D plots: e^-, toroid polarity negative



2D plots: empty target



Cuts

The set of runs with trigger t5 were used for this analysis.

A common cuts were applied:

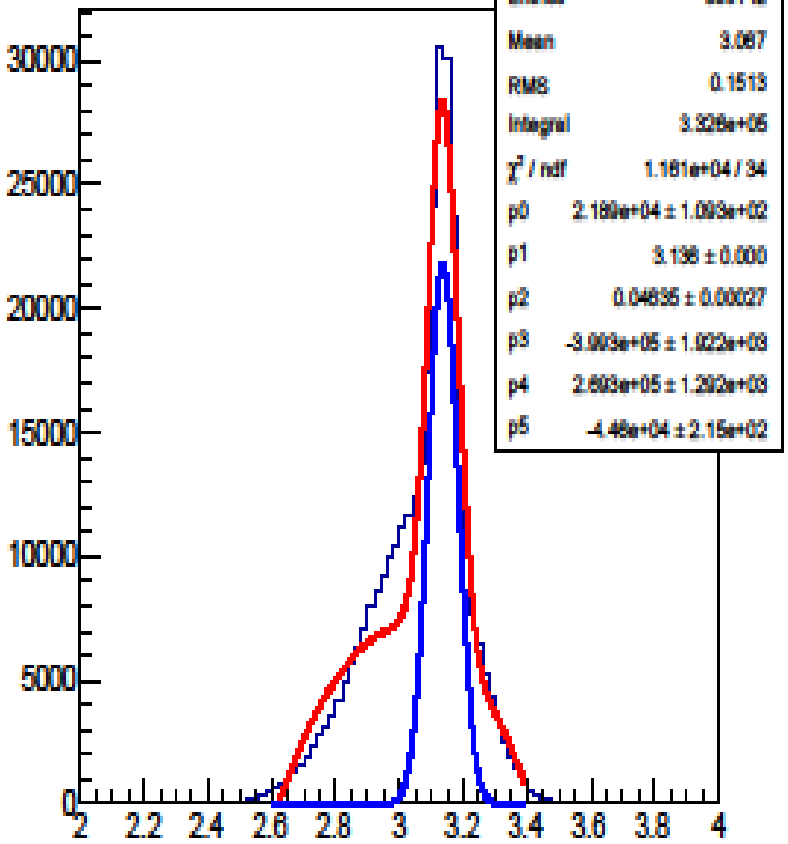
- $MT^{i}_{Left} - MT^{j}_{Right} < 0(ns) \& MT^{i}_{Left} - MT^{j}_{Right} > -14(ns)$
- $Gain(ADCchannel) > 1000$

The results for this analysis are obtained with 5 forward and 6 backward TOF bars.

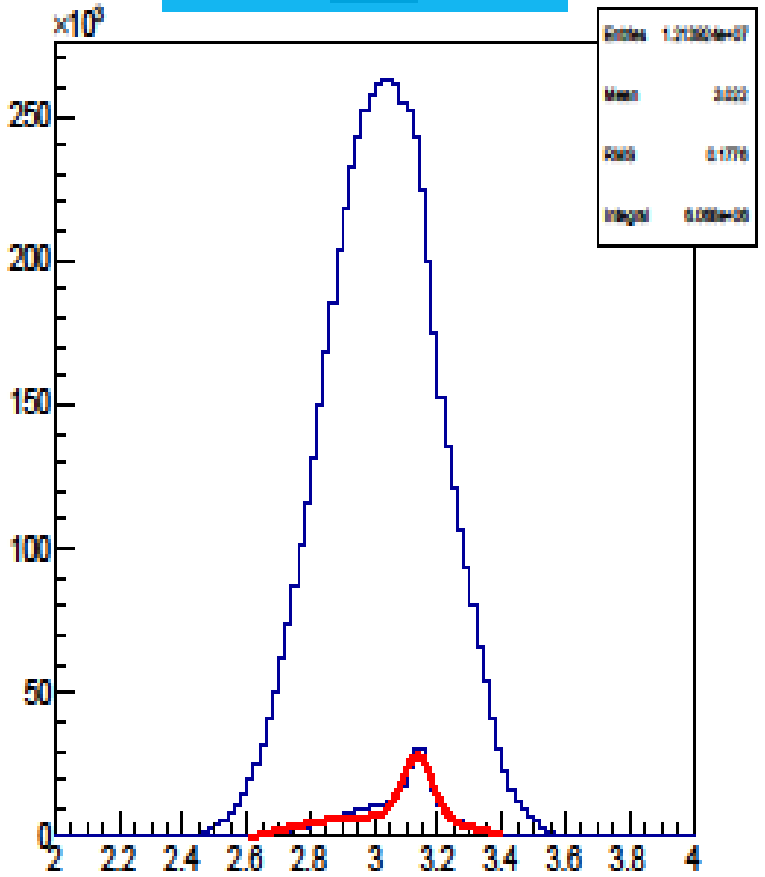
Approximations: straight tracks, all tracks from the center of target, only Y-position from TOF bars (central line of any TOF bar).

Results: distribution in ϕ, e^-, toroid polarity negative

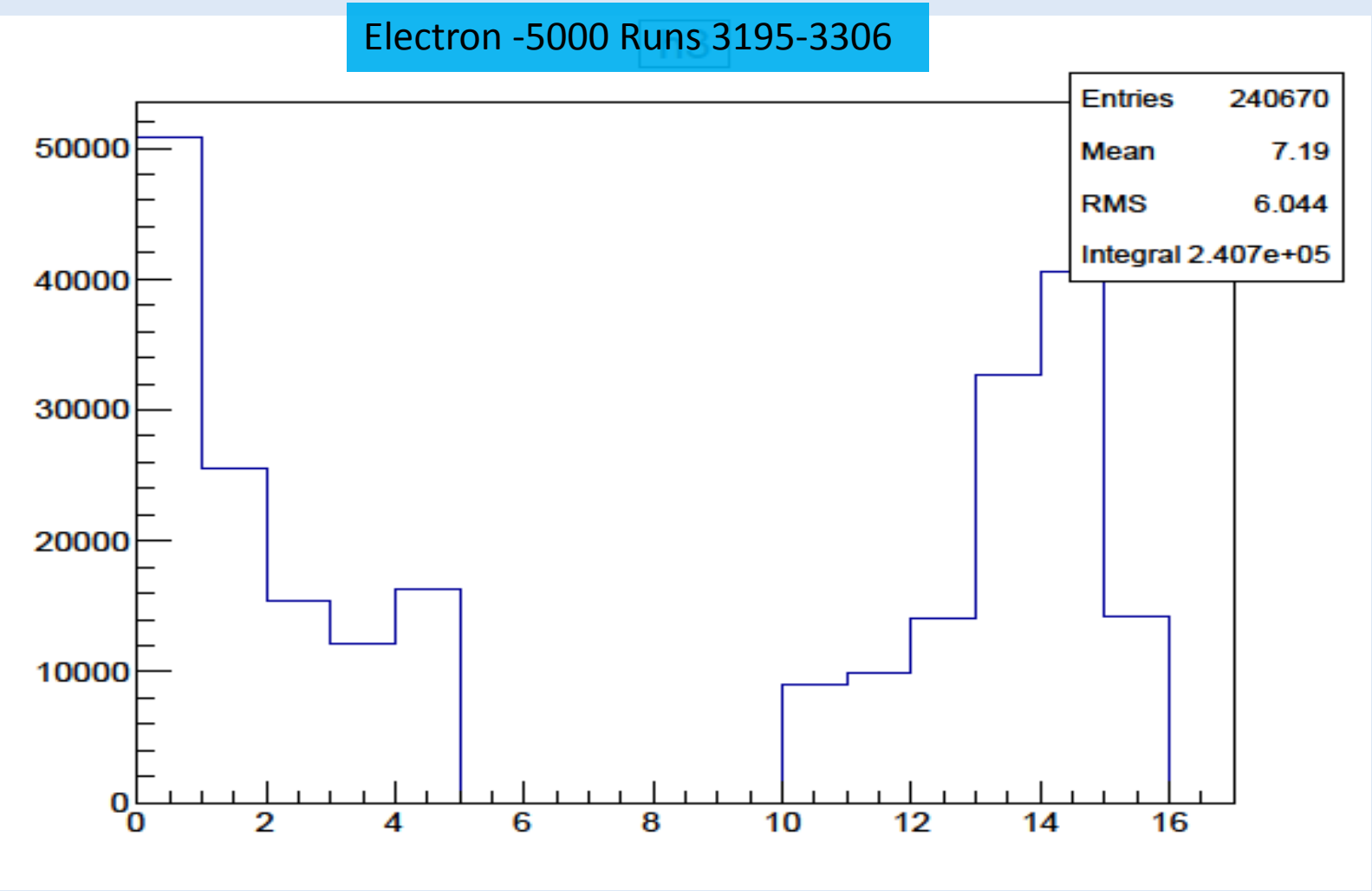
Electron -5000



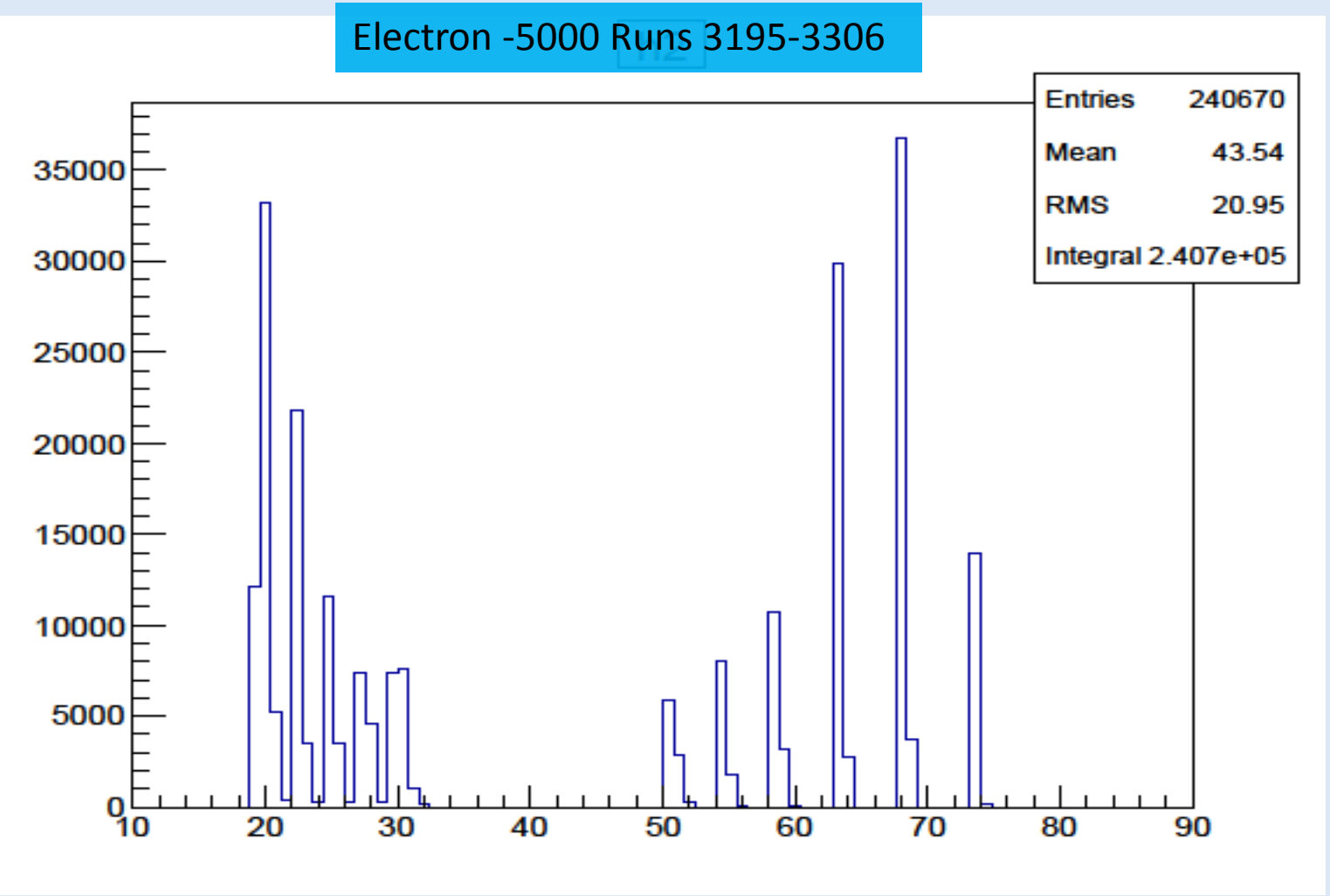
Runs 3195-3306



Distribution over TOF bars, e^-, toroid polarity negative



Distribution in θ, e^-, toroid polarity negative



Time stability of results

Range of runs, number of runs

Dataset	e+, totoid pos.	e+, toroid neg.	e-, toroid pos.	e-, toroid neg.
Run_1	3200 – 3400, 32	3217 – 3266, 36	3173 – 3215, 30	3195 – 3306, 27
Run_2	3485 – 3513, 23	3336 – 3360, 23	3271 – 3392, 33	3325 – 3445, 26
Run_3	3550 – 3647, 29	3378 – 3394, 17	3401 – 3401, 29	3446 – 3475, 30

Mean $\pm$ sigma

Dataset	e+, totoid pos.	e+, toroid neg.	e-, toroid pos.	e-, toroid neg.
Run_1	3.138 ± 0.042	3.137 ± 0.047	3.139 ± 0.048	3.136 ± 0.046
Run_2	3.139 ± 0.041	3.137 ± 0.046	3.137 ± 0.048	3.136 ± 0.047
Run_3	3.138 ± 0.042	3.138 ± 0.046	3.138 ± 0.047	3.136 ± 0.047

Rates of elastic events

The average deadtime was taken as 0.25

After the background correction:

Electrons, magnet - , sccm=0.8 (runs 83, 3240 - 3647) – $Rate_{elastic}$ = 6.2/sec.

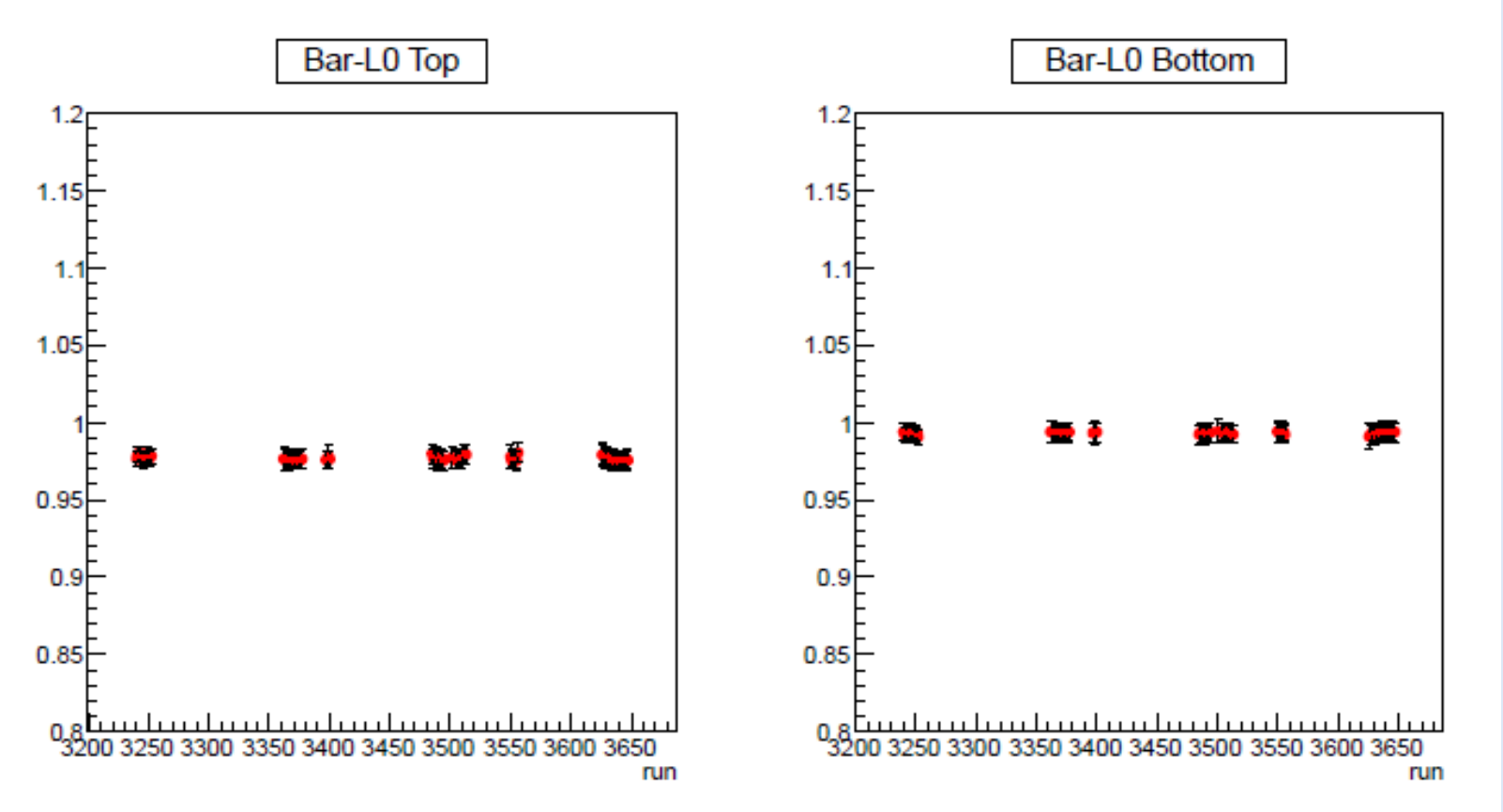
Positrons, magnet - , sccm=0.8 (runs 76, 3217 - 3394) – $Rate_{elastic}$ = 3.7/sec.

Electrons, magnet +, sccm=0.8 (runs 92, 3173 - 3421) – $Rate_{elastic}$ = 3.4/sec.

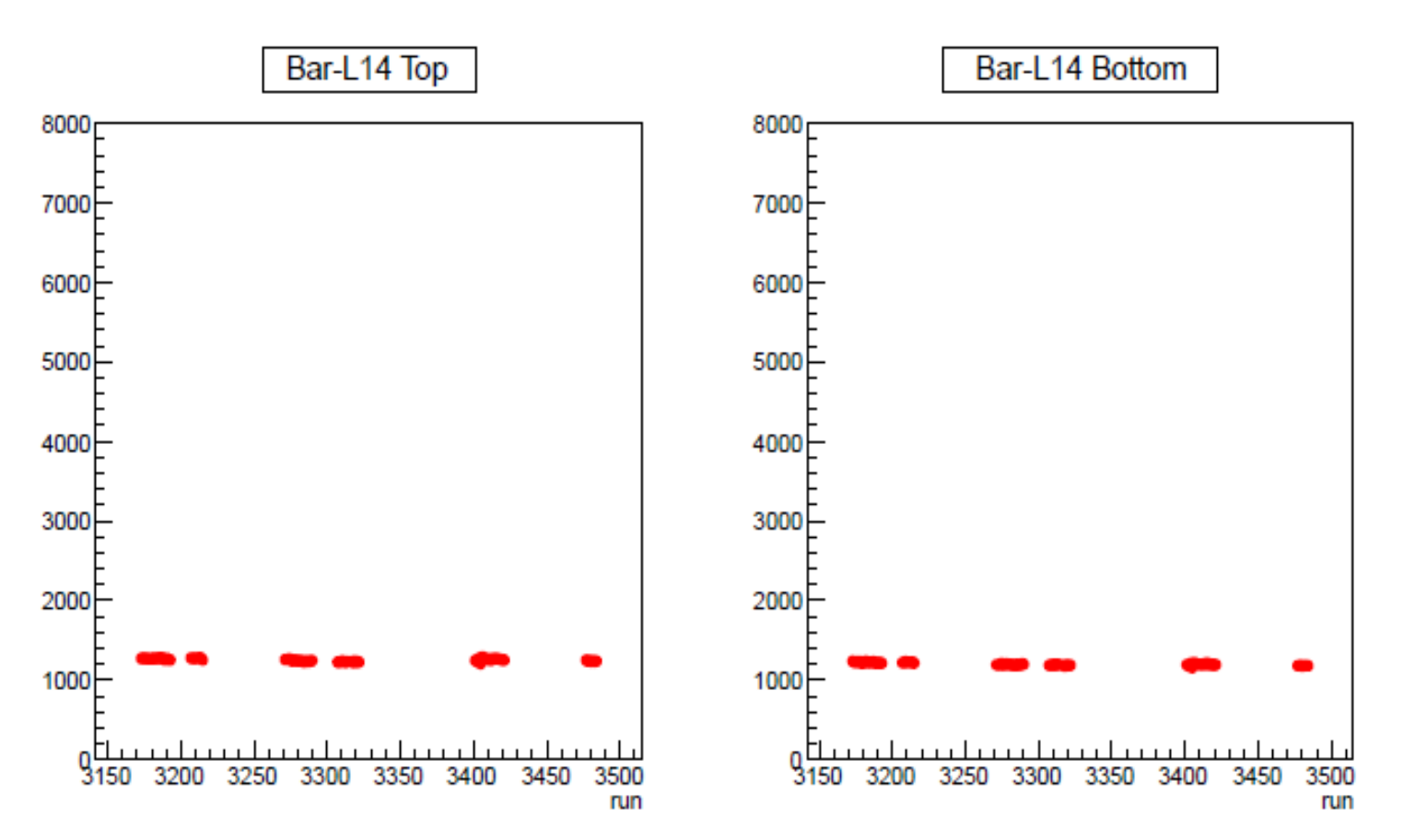
Positrons, magnet +, sccm=0.8 (runs 84, 3195 - 3475) – $Rate_{elastic}$ = 5.9/sec.

Stability of TOFs operation

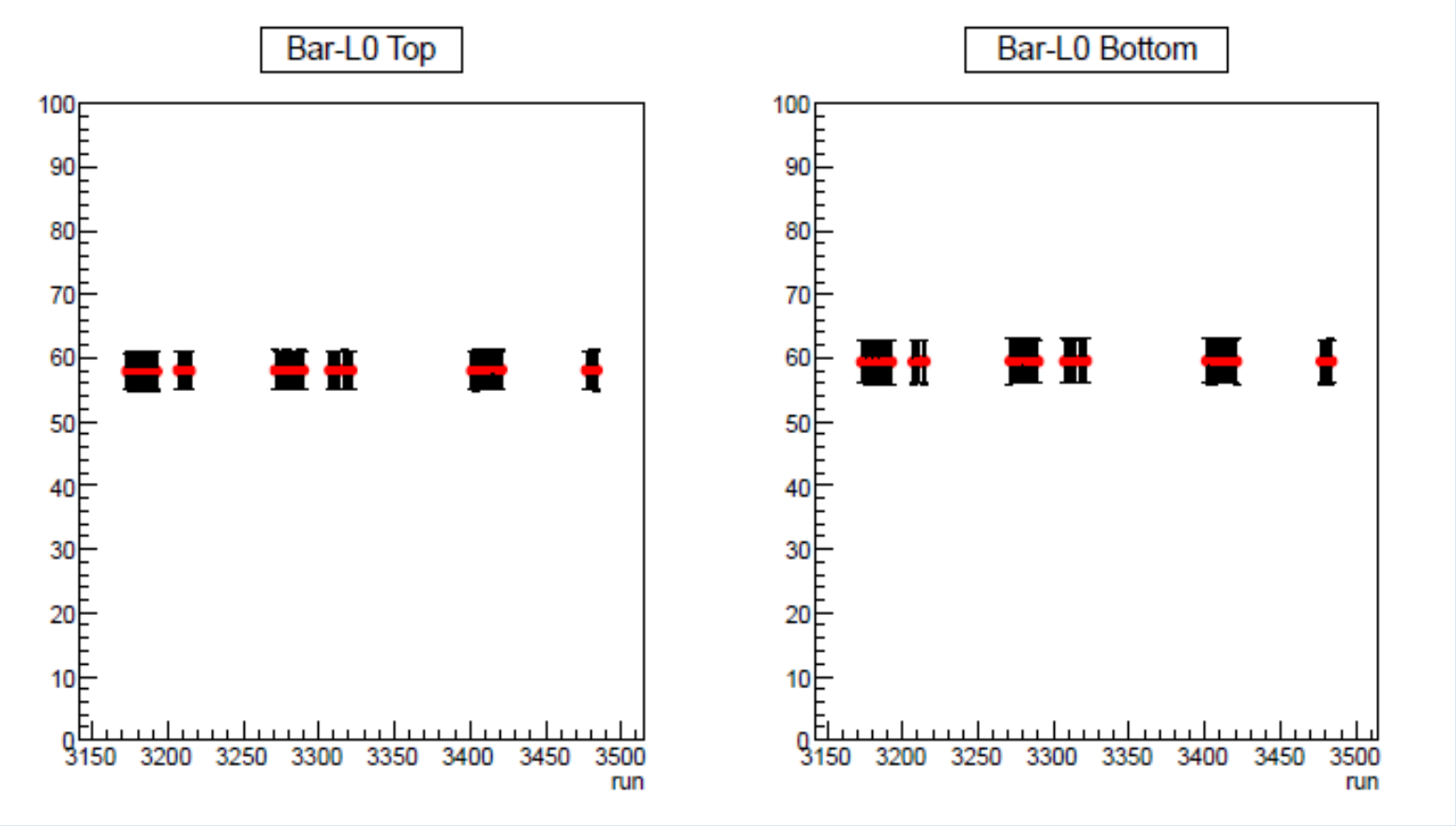
The ratio R was defined as $R_t = (t\&b)/t$ and $R_b = (t\&b)/b$ when exactly one TOF bar fired in each sector



Stability of TOFs operation: gain vs. runs



Stability of TOFs operation: meantime vs. runs



Outlook/Plans

Outlook:

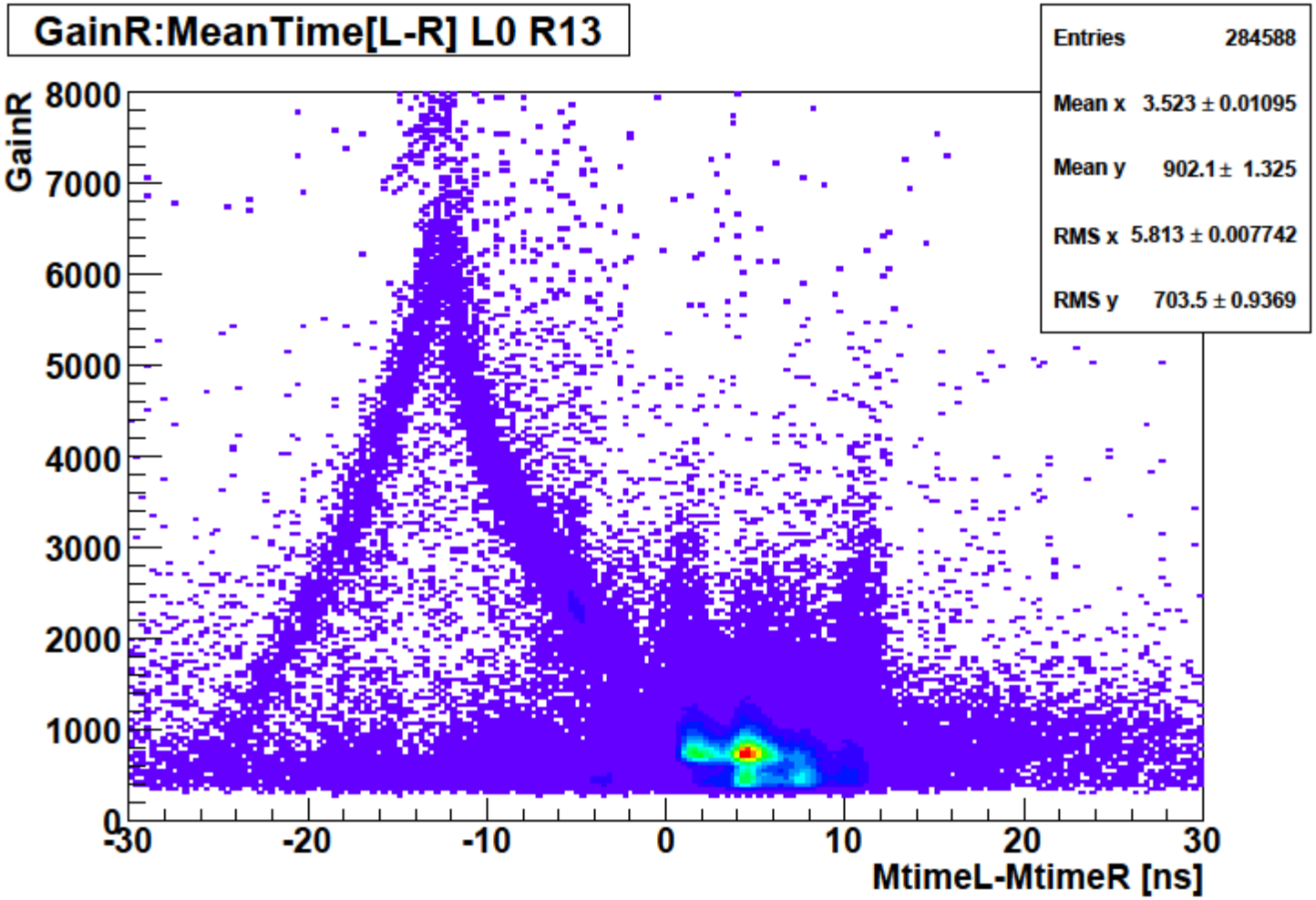
- About 30% of collected data was analysed;
- Coplanarity of elastic events was obtained from available TOF data only;
- Results show time stability for different beam charges and toroid polarity.

Plans:

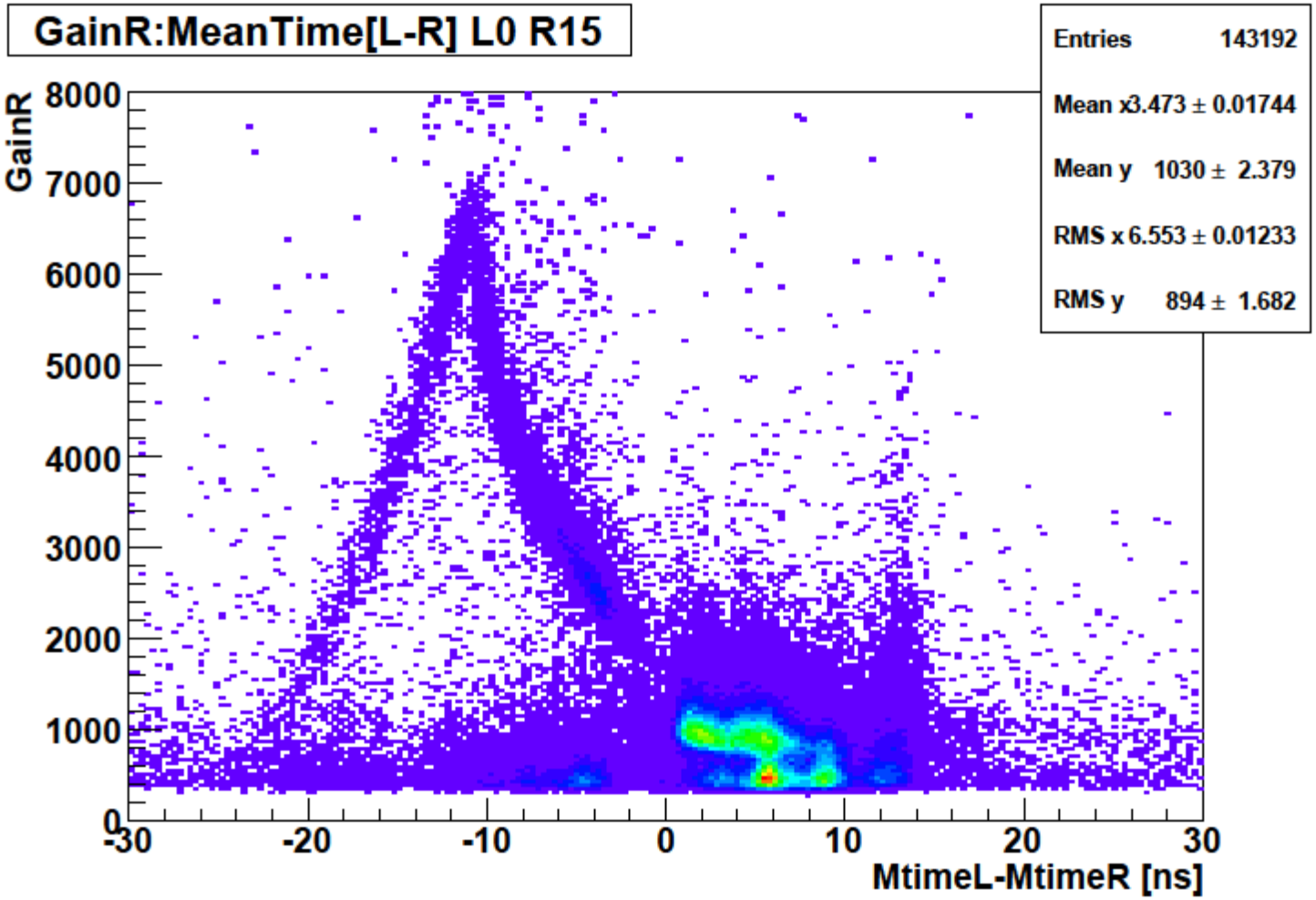
- Incorporate magnet field reconstruction with this analysis;
- Possible inclusion of a plugin in cooker.

Backup Slides

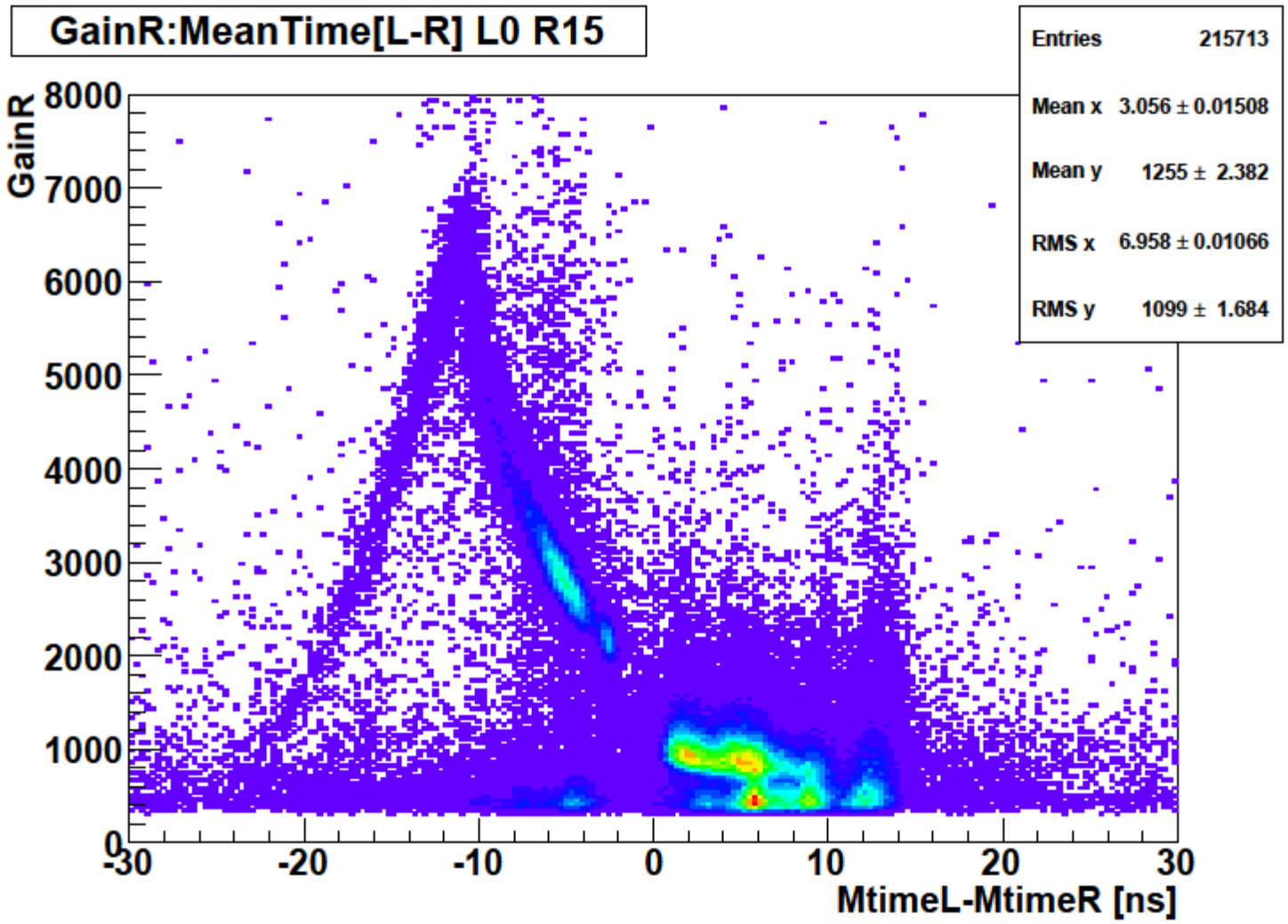
2D plots: e^+, toroid polarity negative



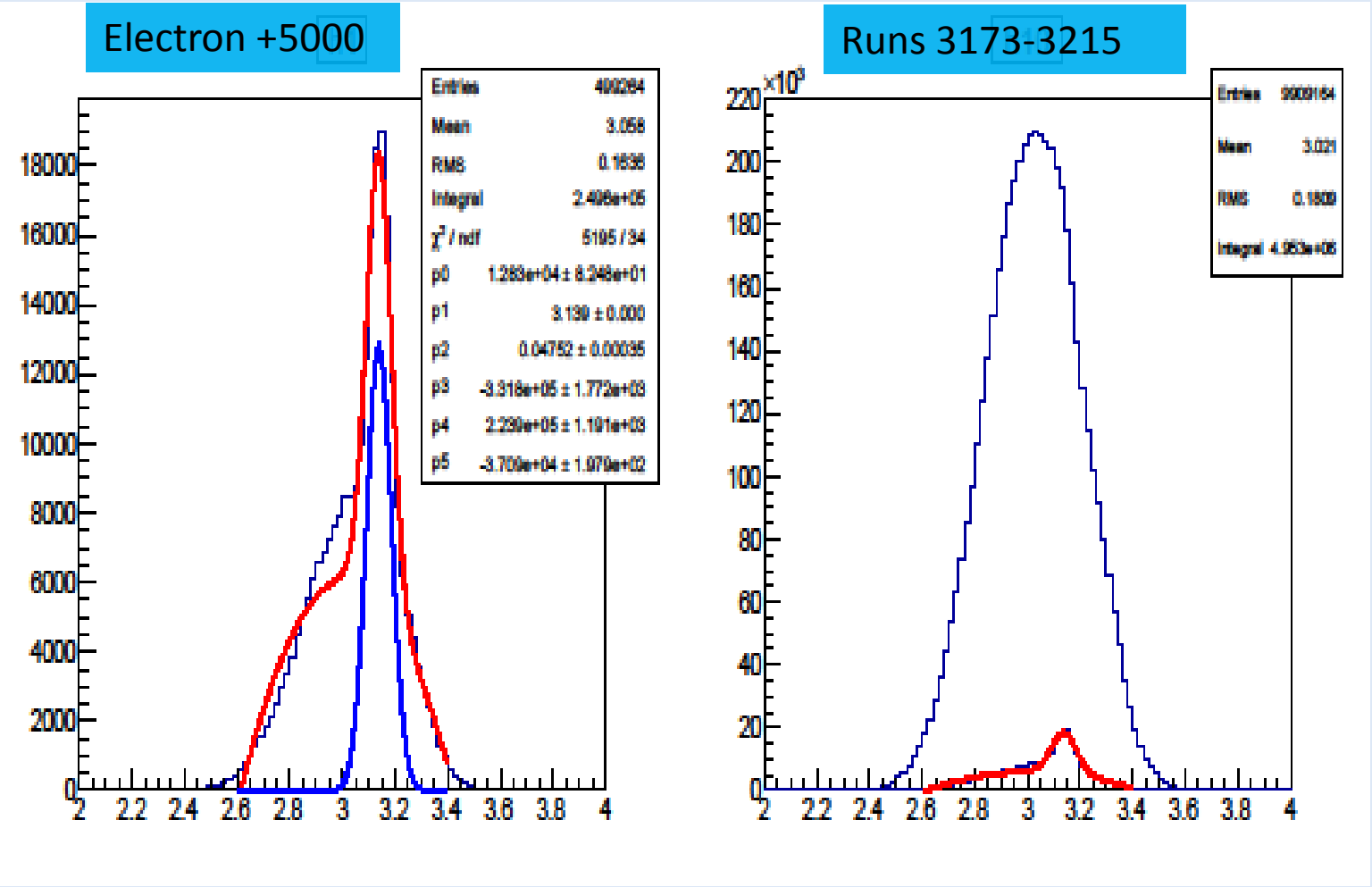
2D plots: e^-, toroid polarity positive



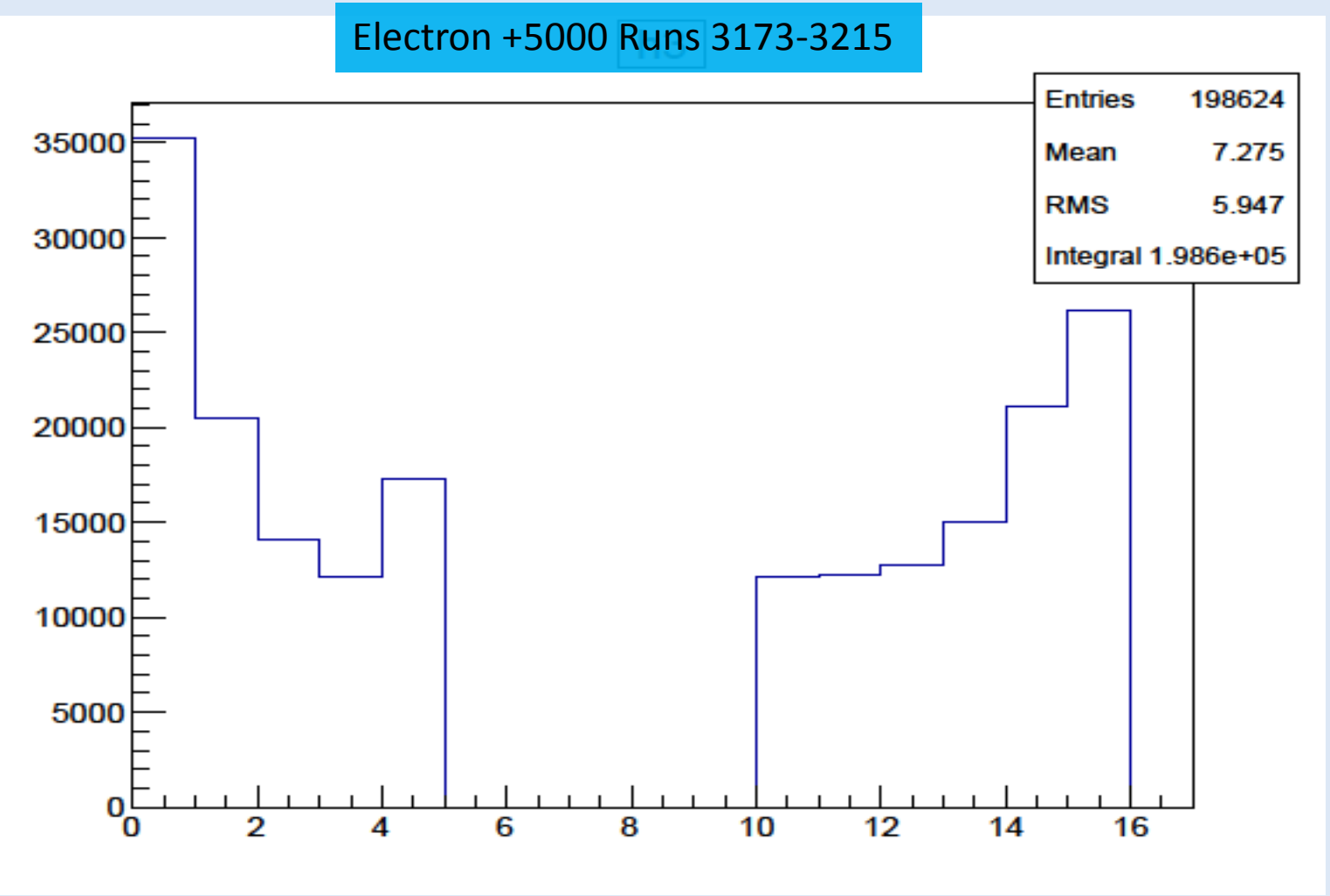
2D plots: e^+, toroid polarity positive



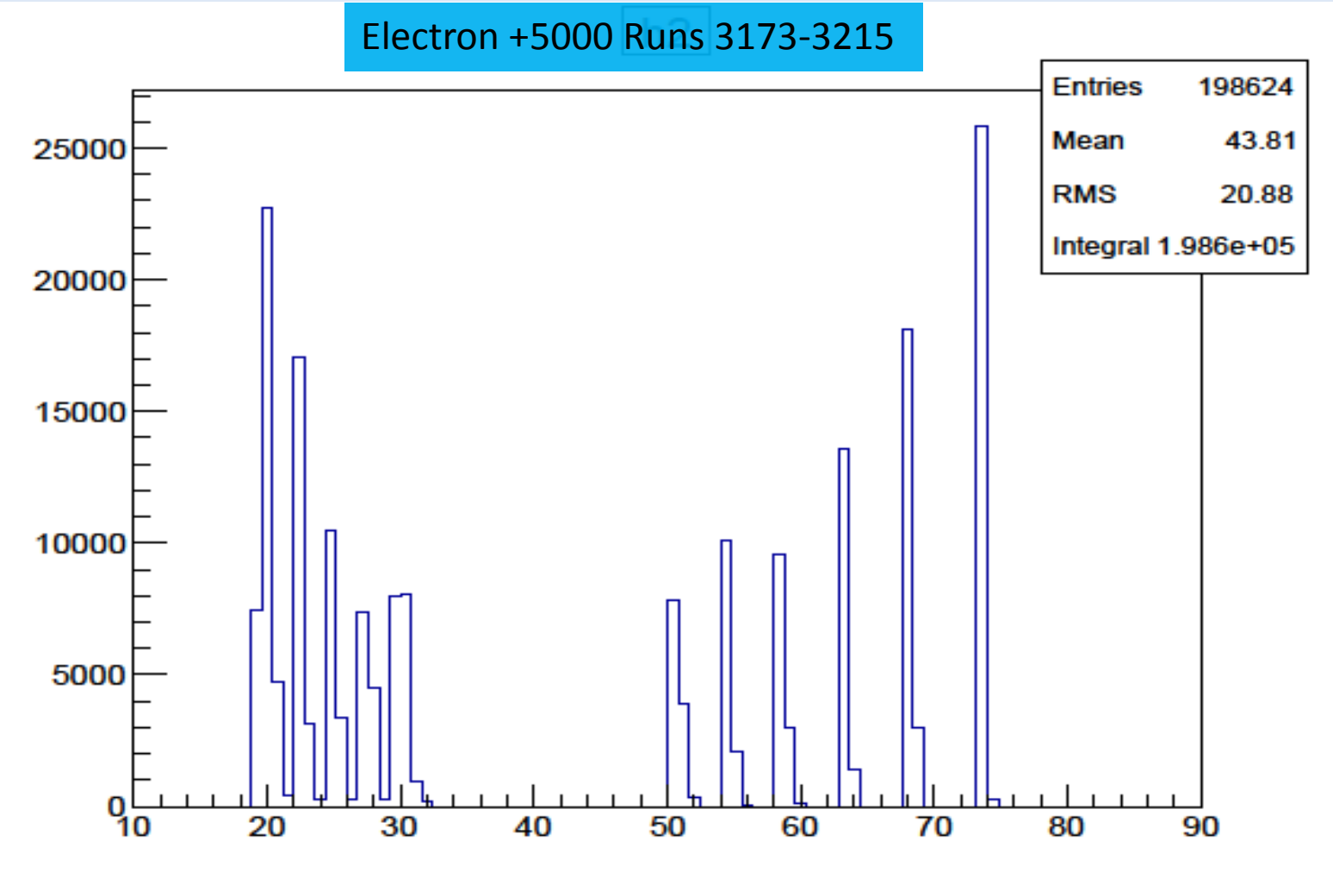
Distribution in ϕ, e^-, toroid polarity positive



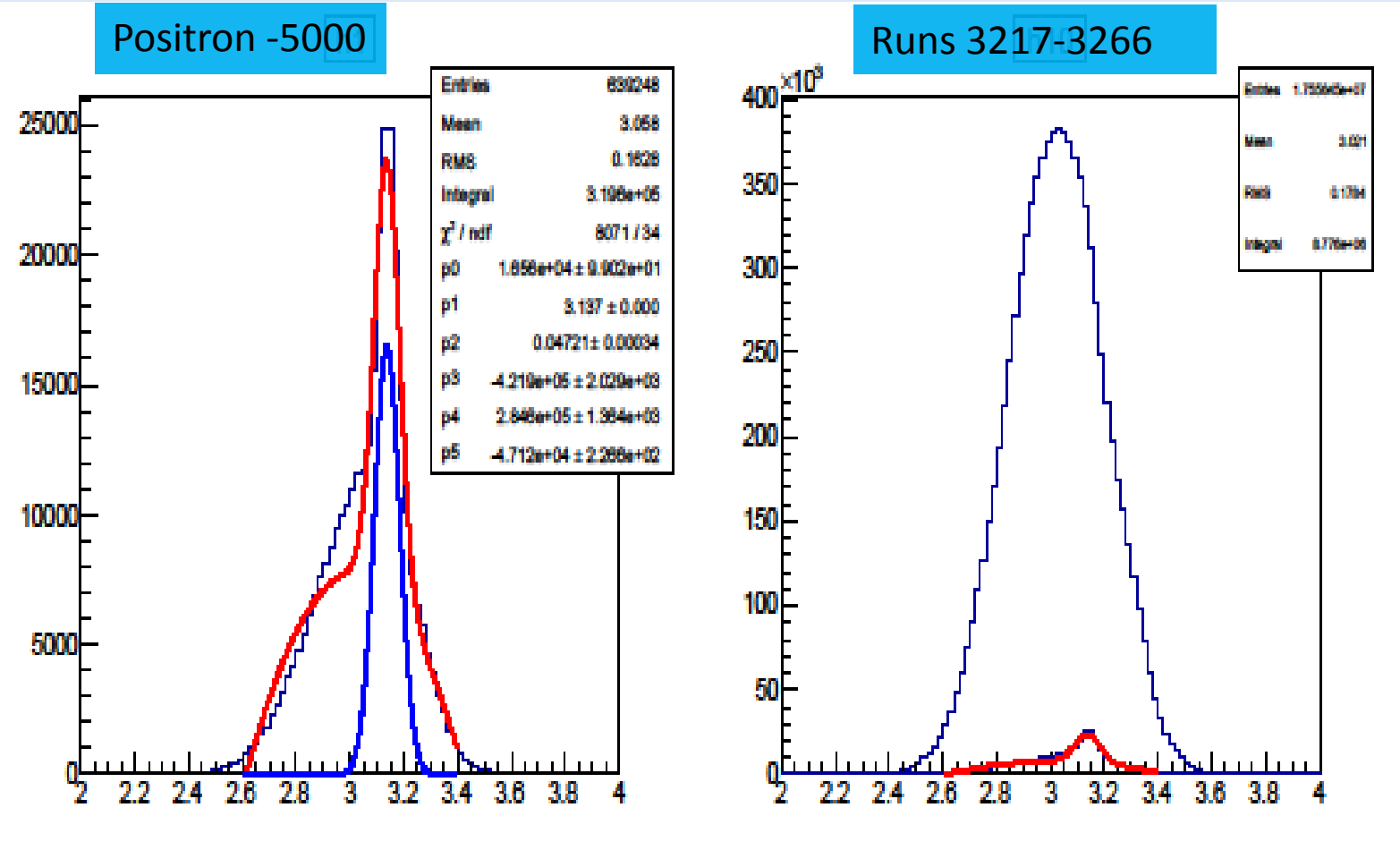
Distribution over TOF bars, e^-, toroid polarity positive



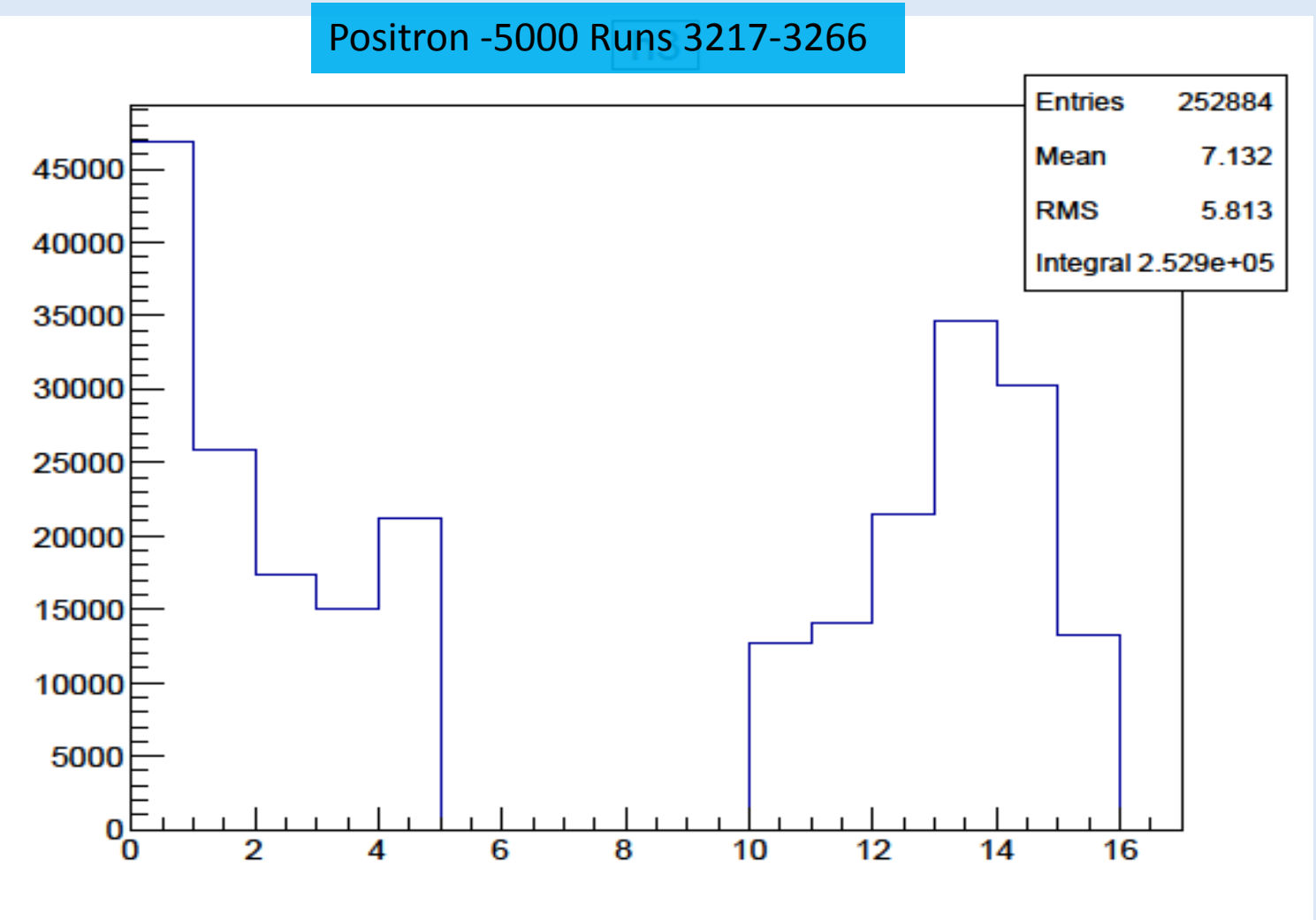
Distribution in θ, e^-, toroid polarity positive



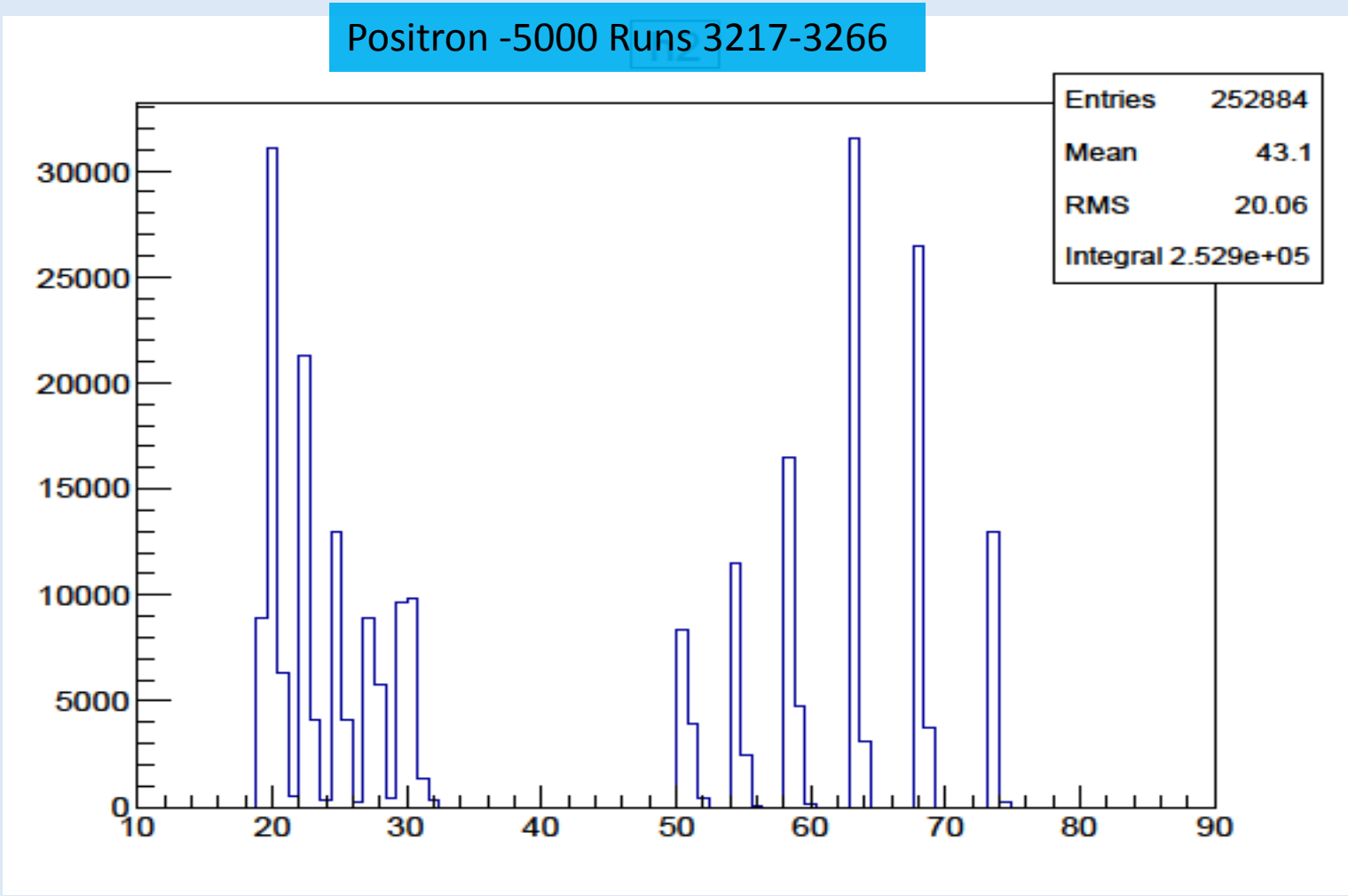
Results: distribution in ϕ, e^+, toroid polarity negative



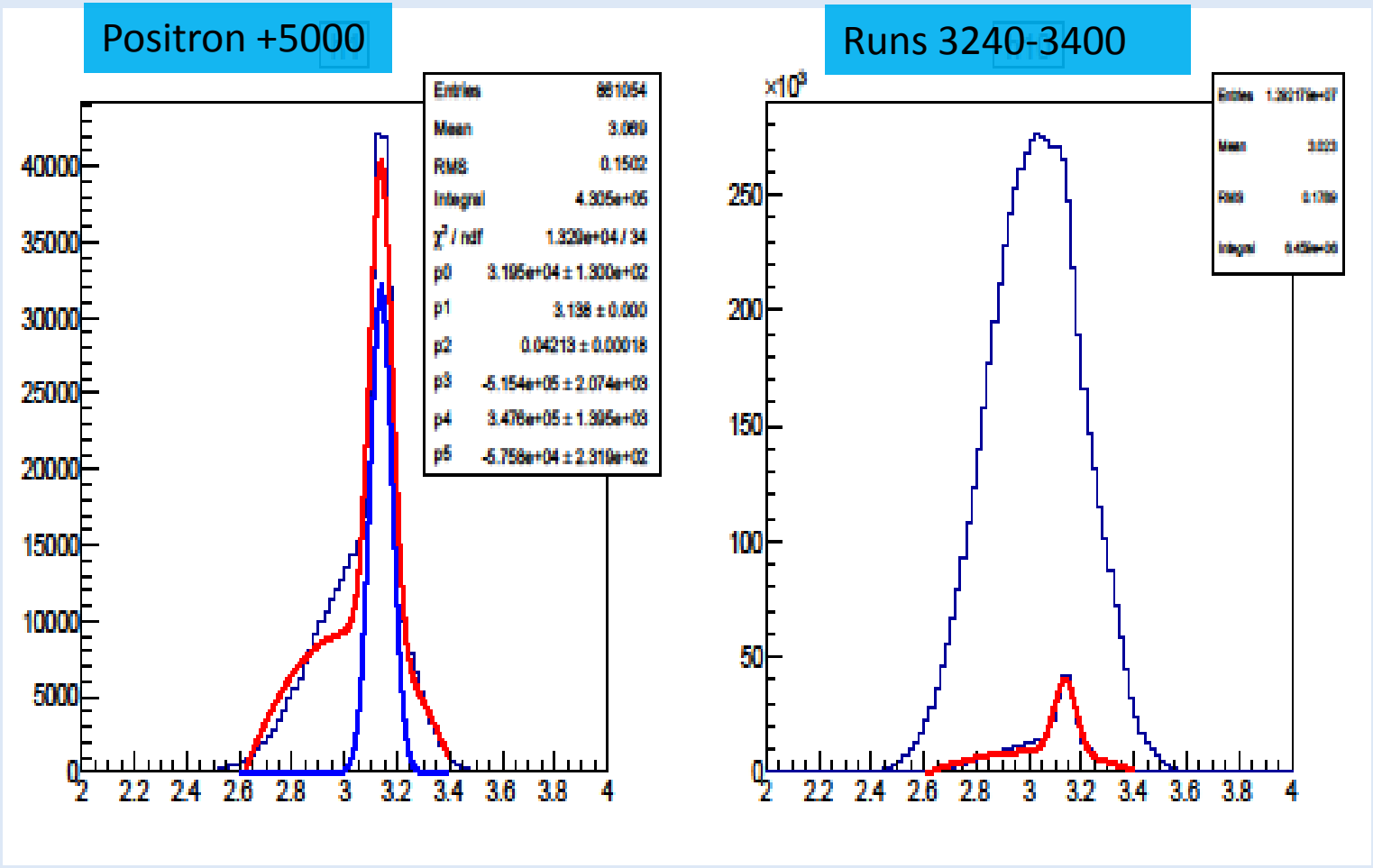
Distribution over TOF bars, e^+, toroid polarity negative



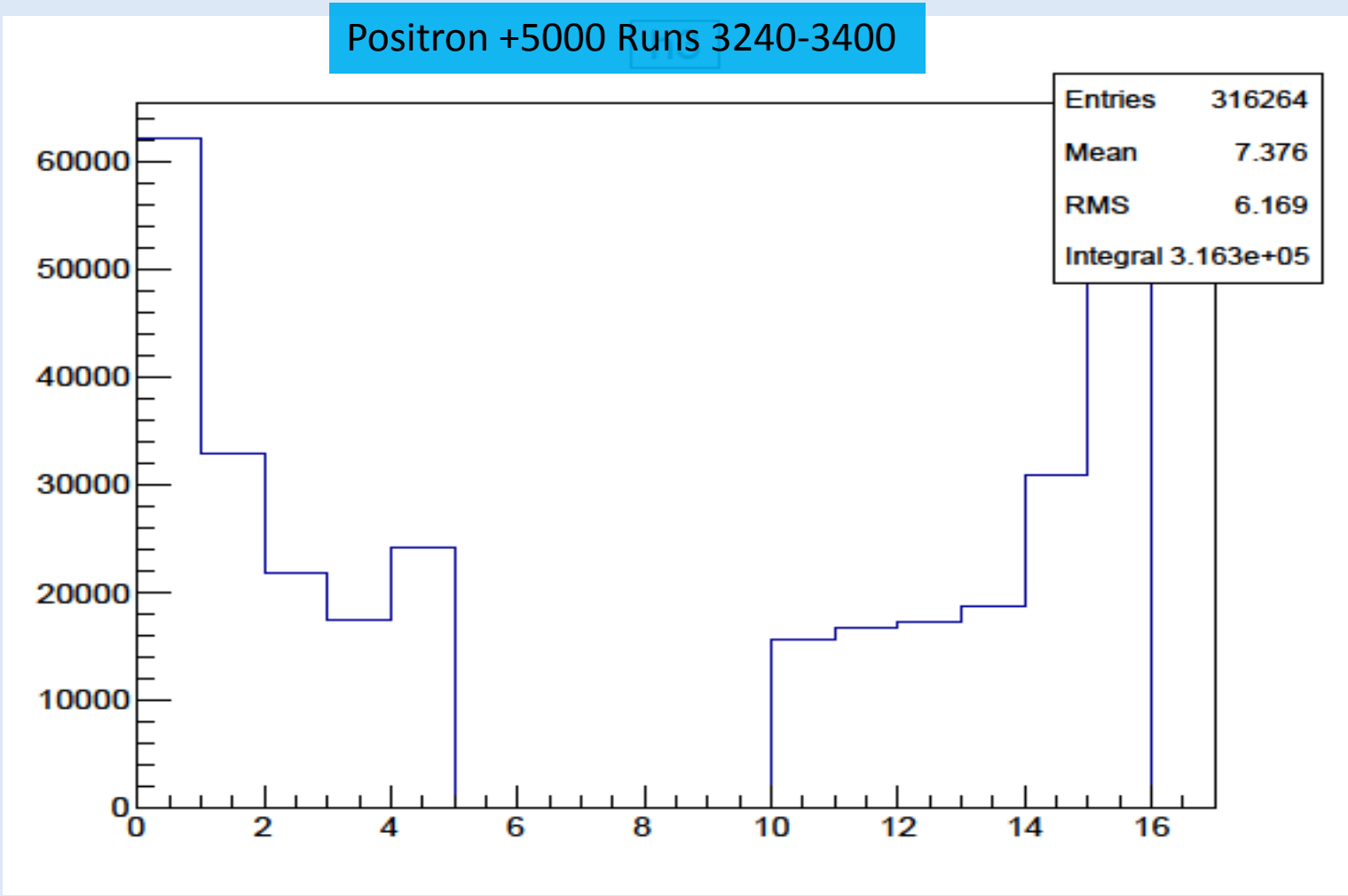
Distribution in θ, e^+, toroid polarity negative



Results: distribution in ϕ, e^+, toroid polarity positive



Distribution over TOF bars, e^+, toroid polarity positive



Distribution in θ, e^+, toroid polarity positive