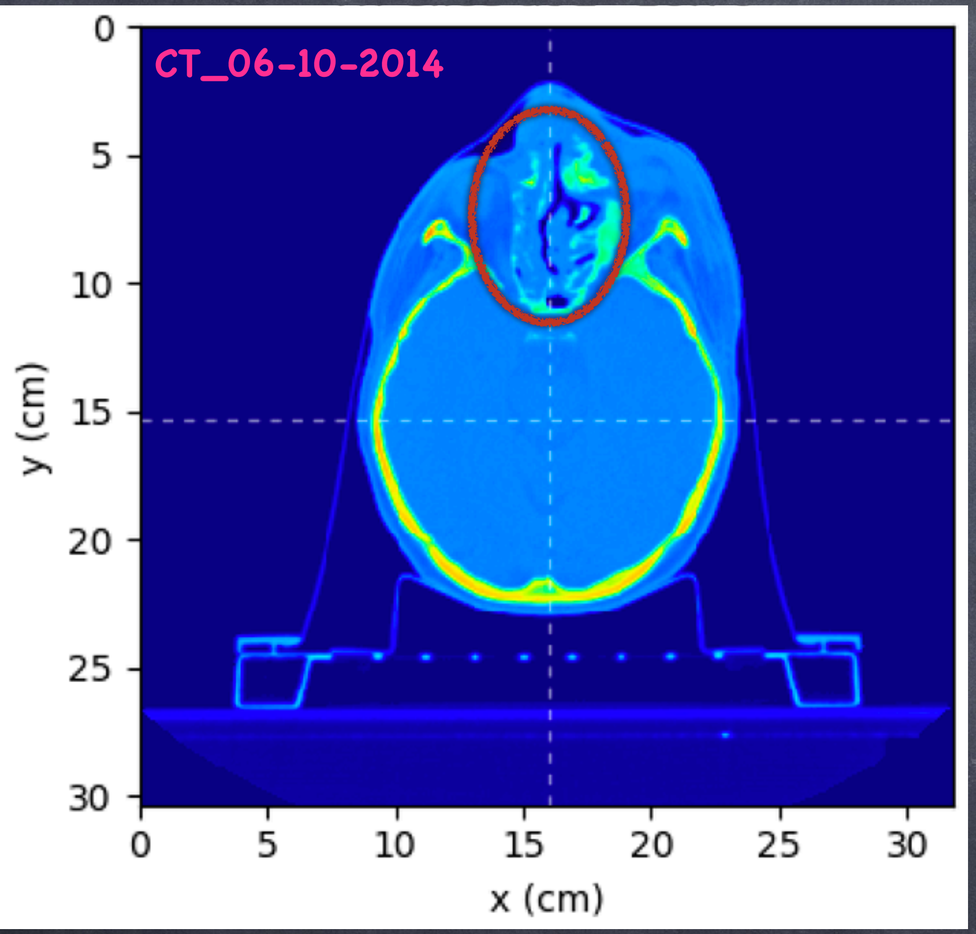
Inter-fractional Monitoring with DP

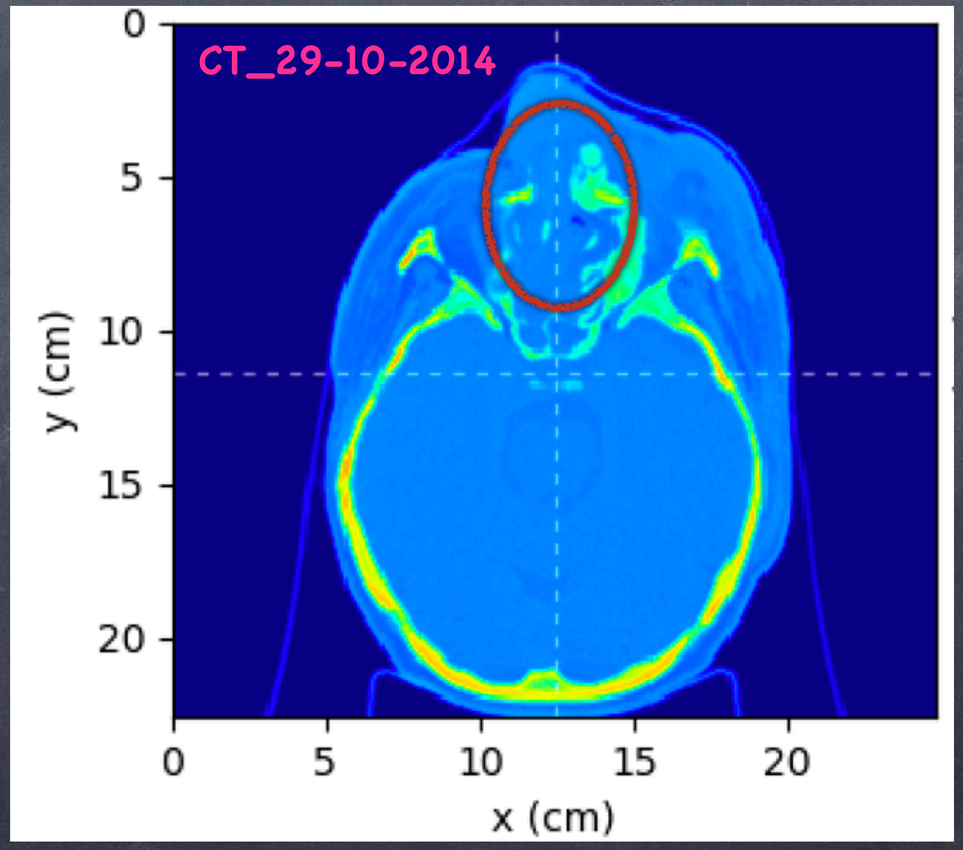
ARPG meeting 21/12/2018

M. Fischetti

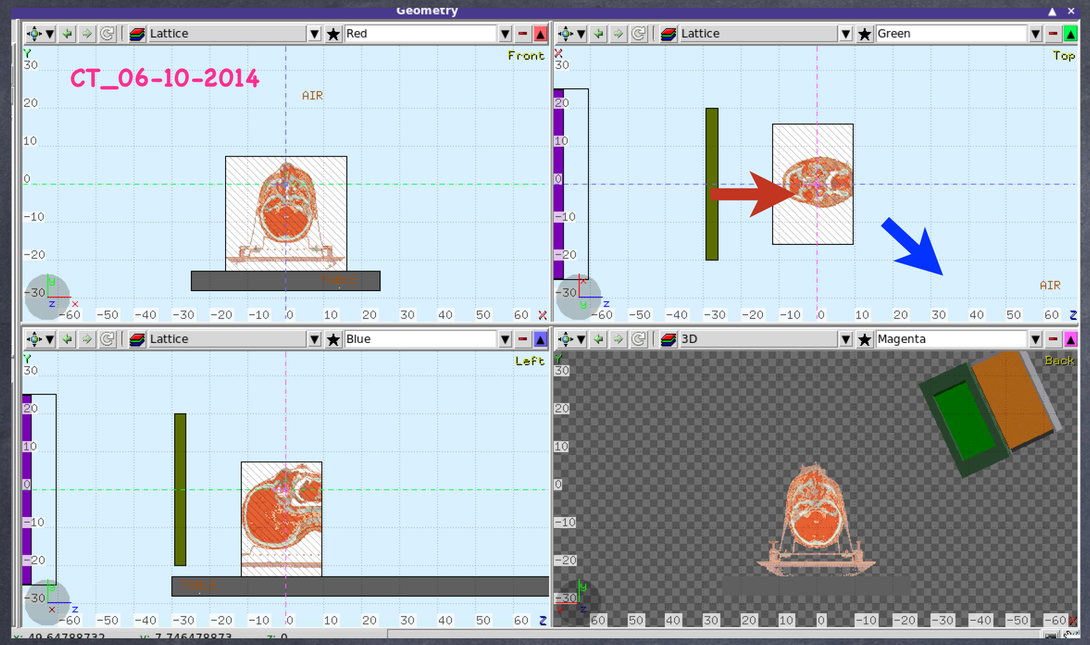
Inter-fractional Monitoring: goal

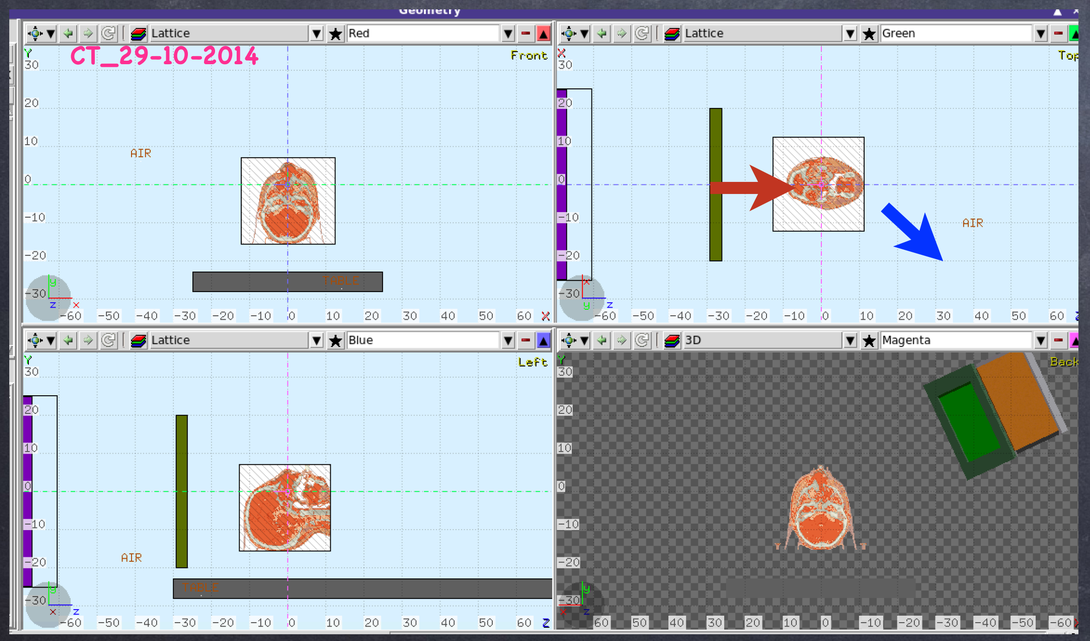


Can the DP spot the effects of the toxicities or the patient mis-positioning that could occur during the treatment (~4 weeks)?



Fluka Simulation





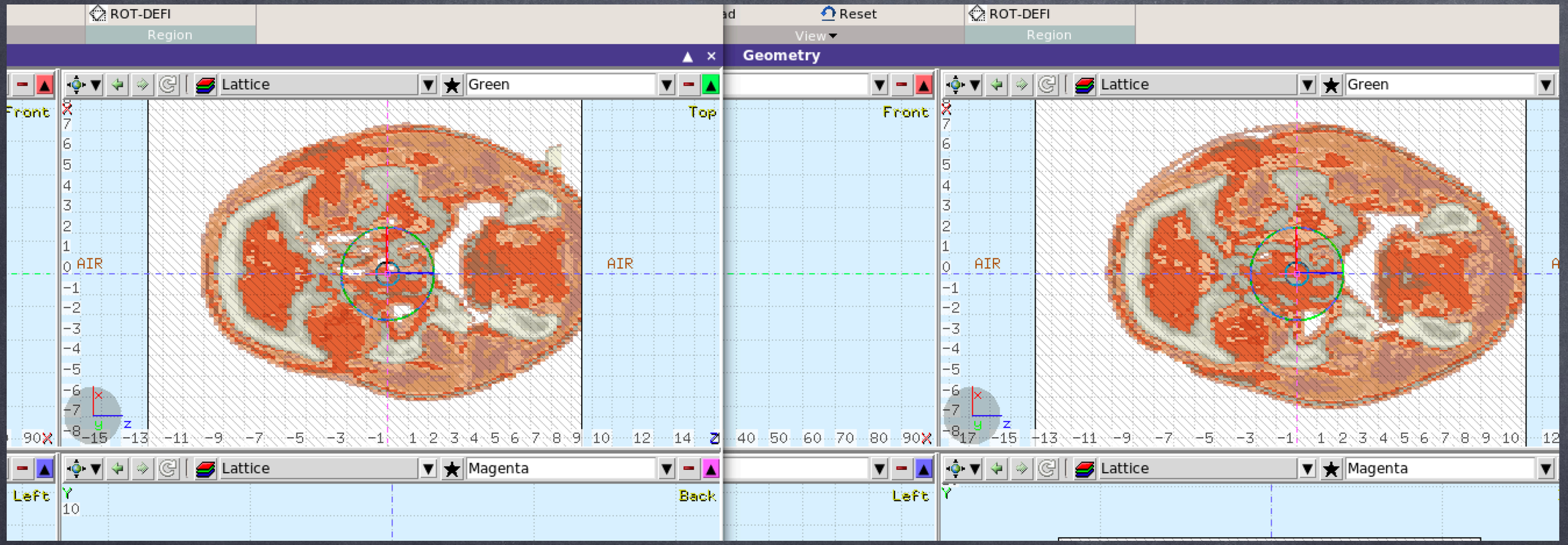
Real treatment
(the same TP for each CT)

Real Patient

Real
Positioning

One fraction
of ^{12}C ions

Manual alignment of the 2 CT



I tried to do the best!!!!!!

Quantitative comparison of POCAs distribution

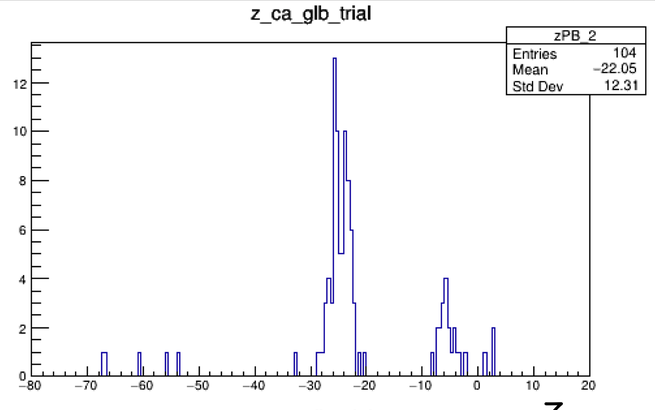
We don't need to unfolding the "matter effect"

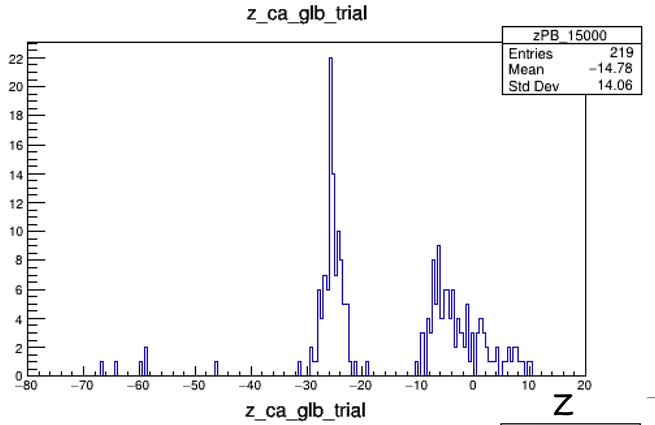
We have used the '1D' projections along the PB direction to perform a quantitative comparison

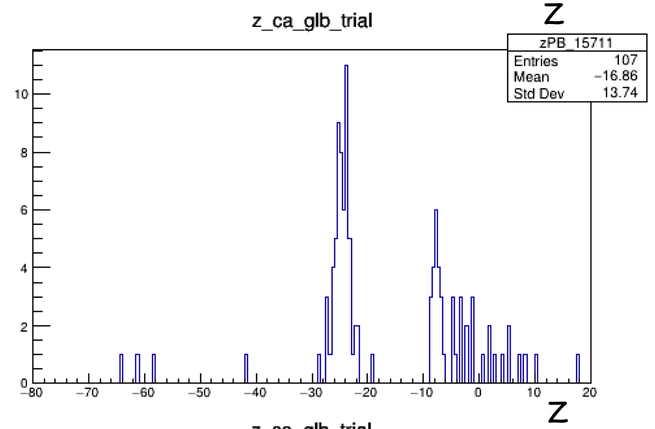
Kolmogorov & Chi² Test

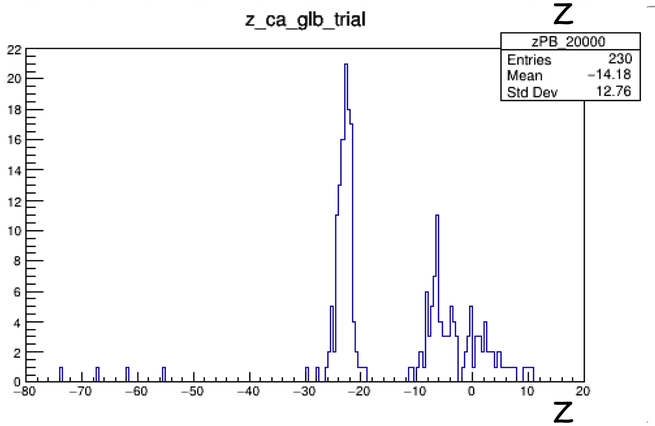
'3D' Study of POCAs
-> next ARPG!!

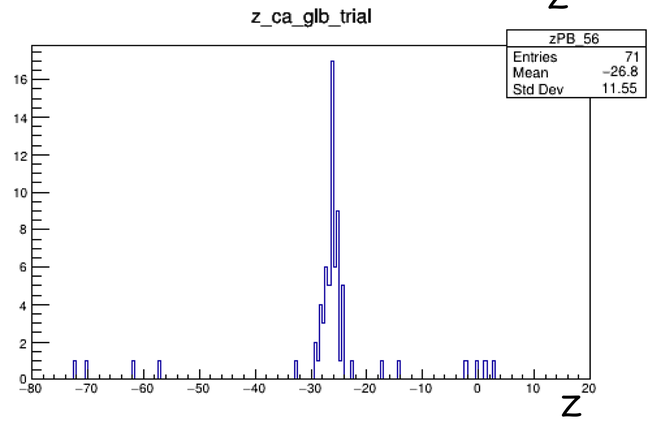
How many tracks?

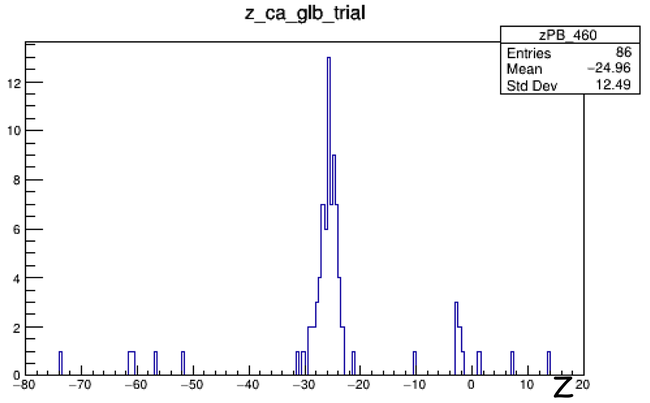




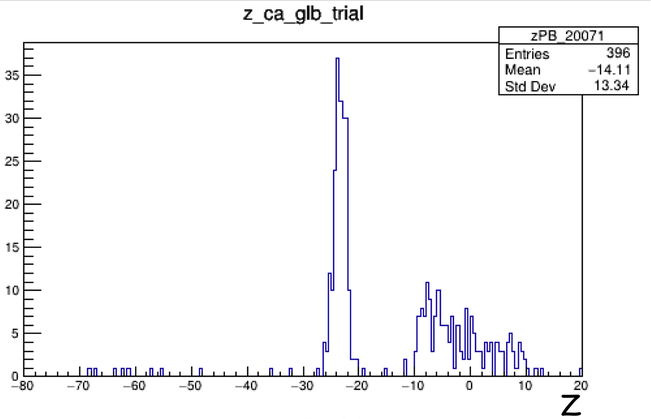


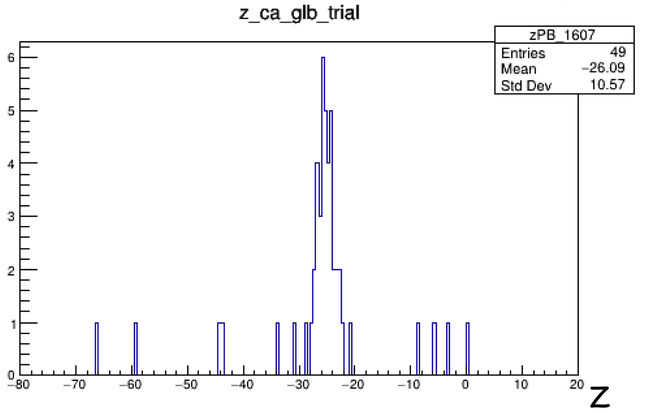




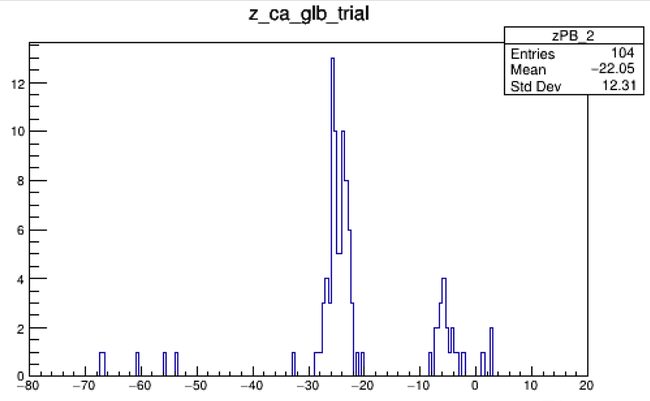


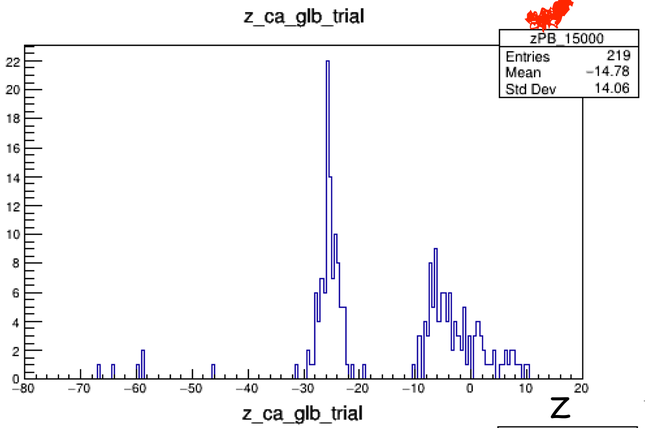
Low statistic for singol PB (~400 tracks in most populated bins): Packing PB

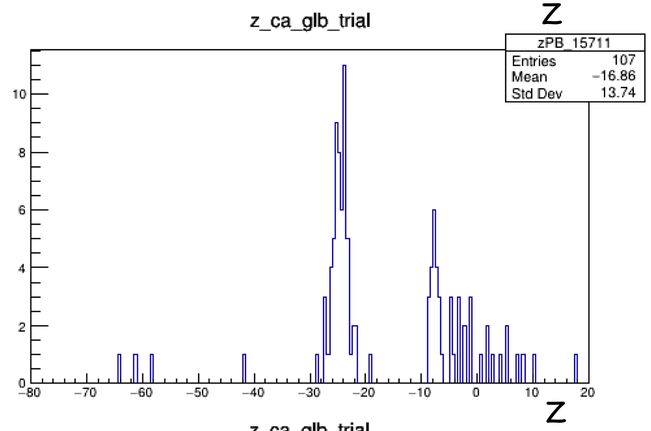


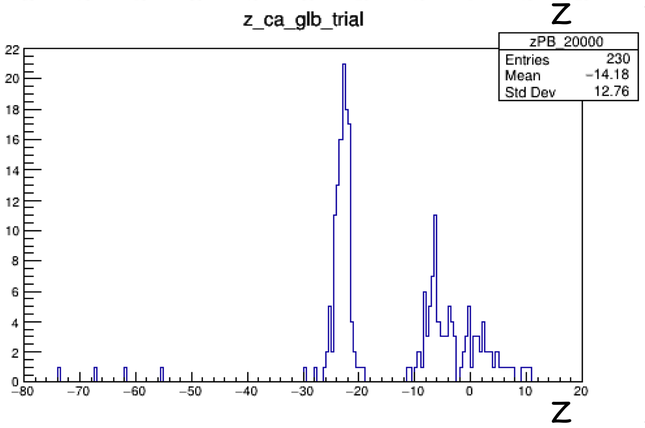


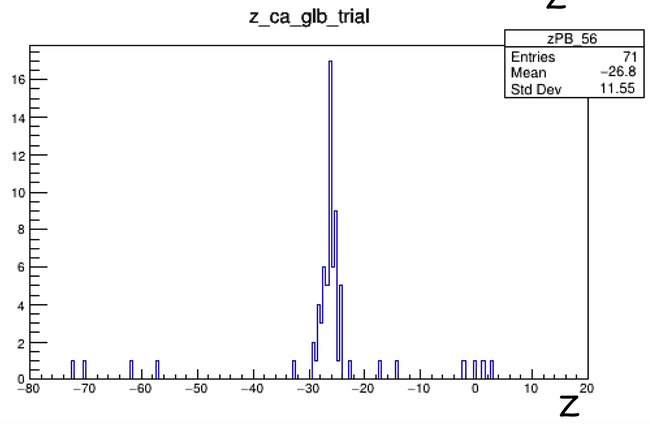
How many tracks?

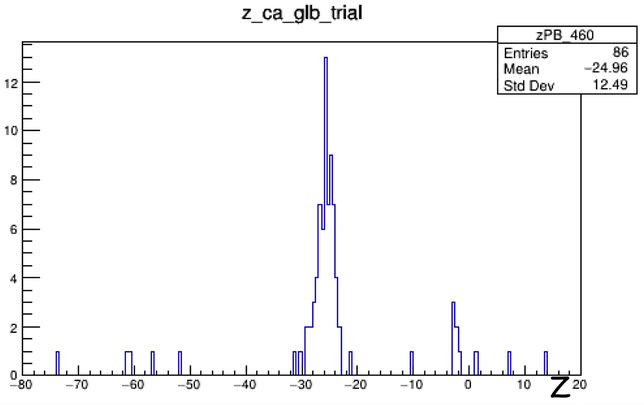




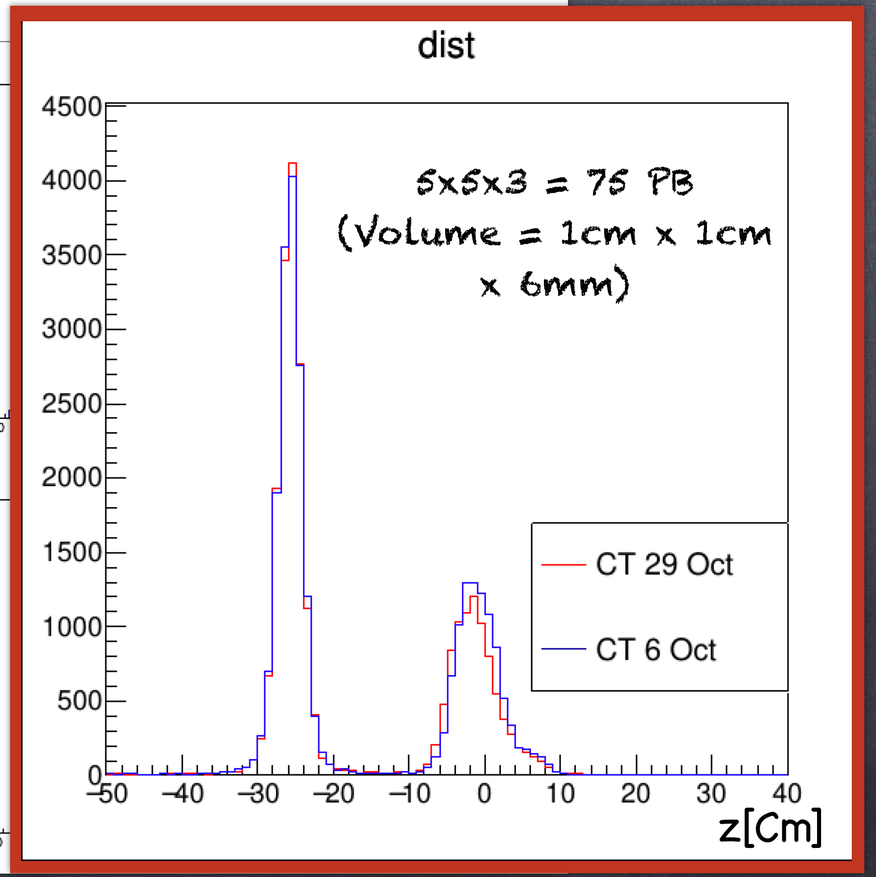




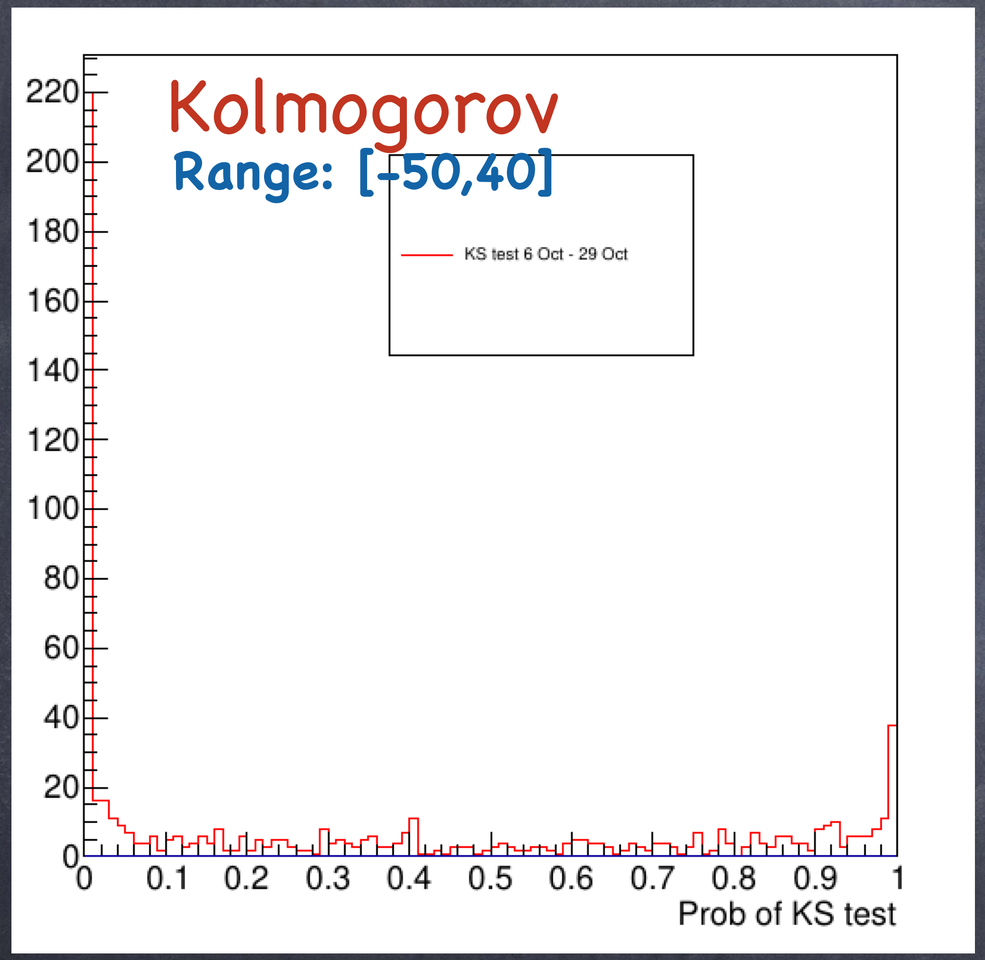


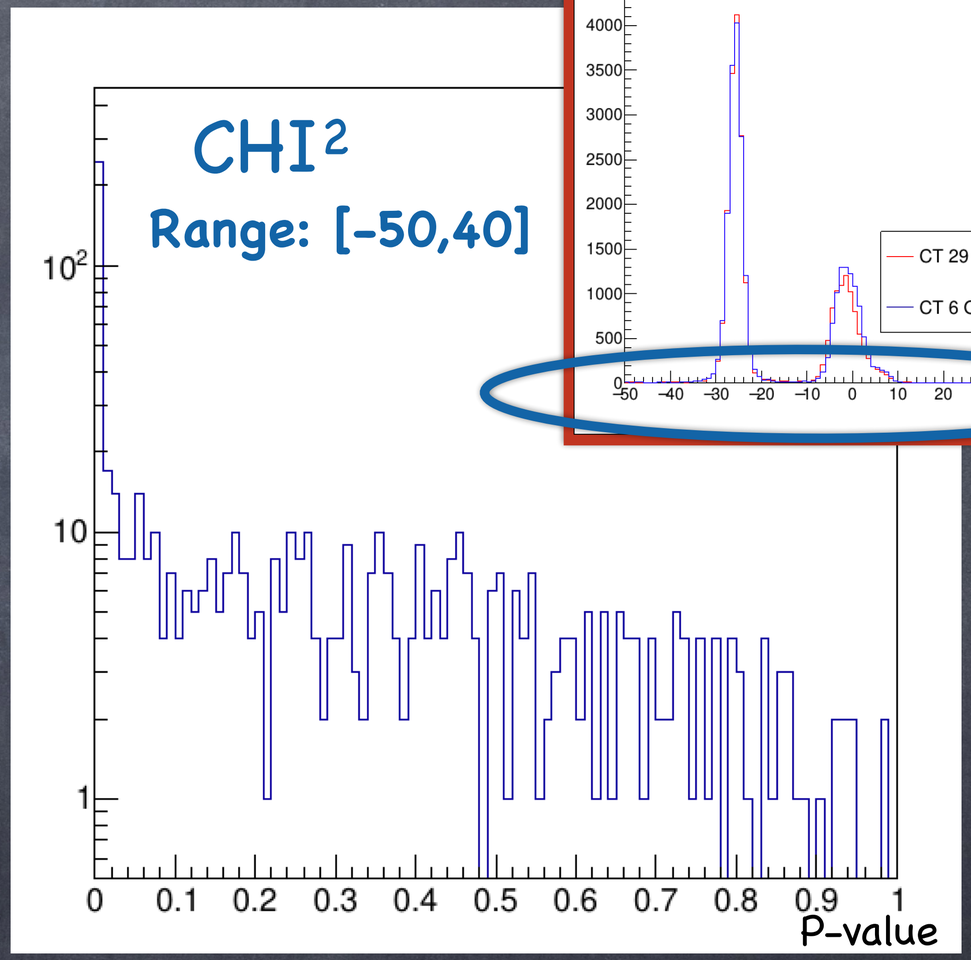


Low statistic for single PB (~400 tracks in most populated bins): Packing PB



Kolmogorov & Chi² Test





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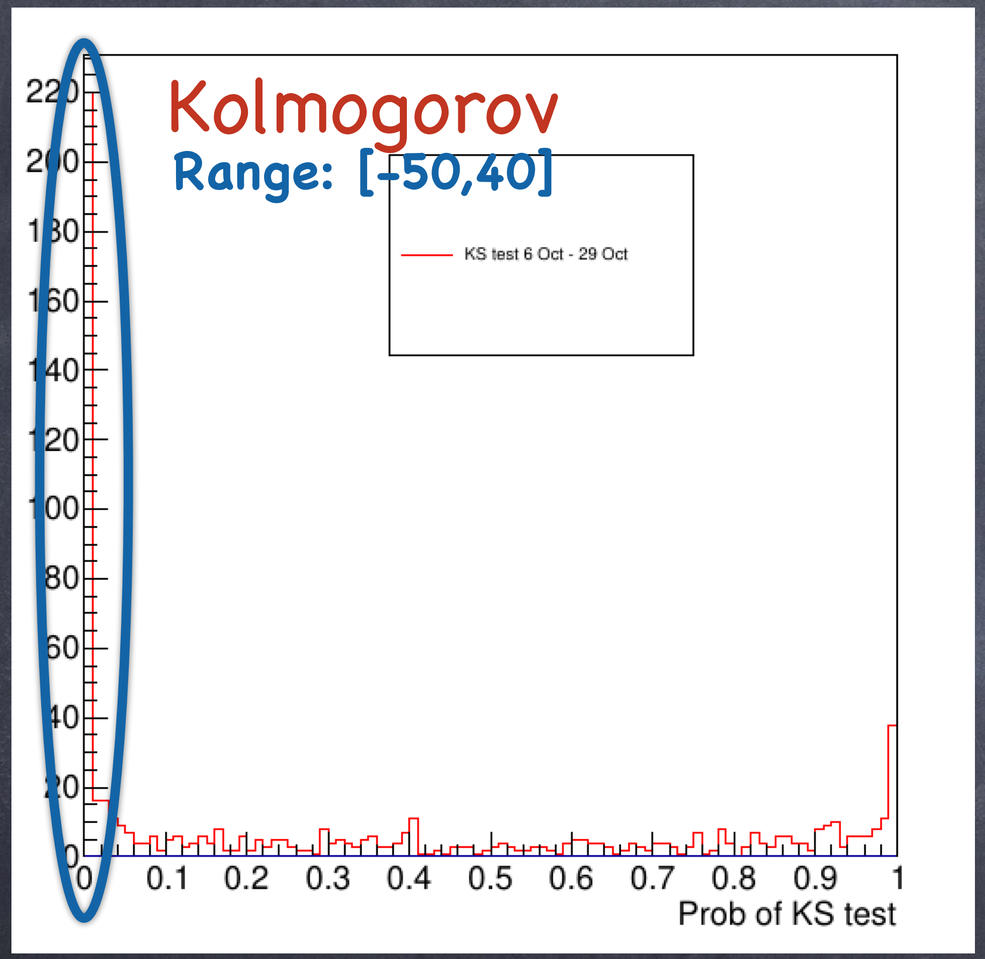

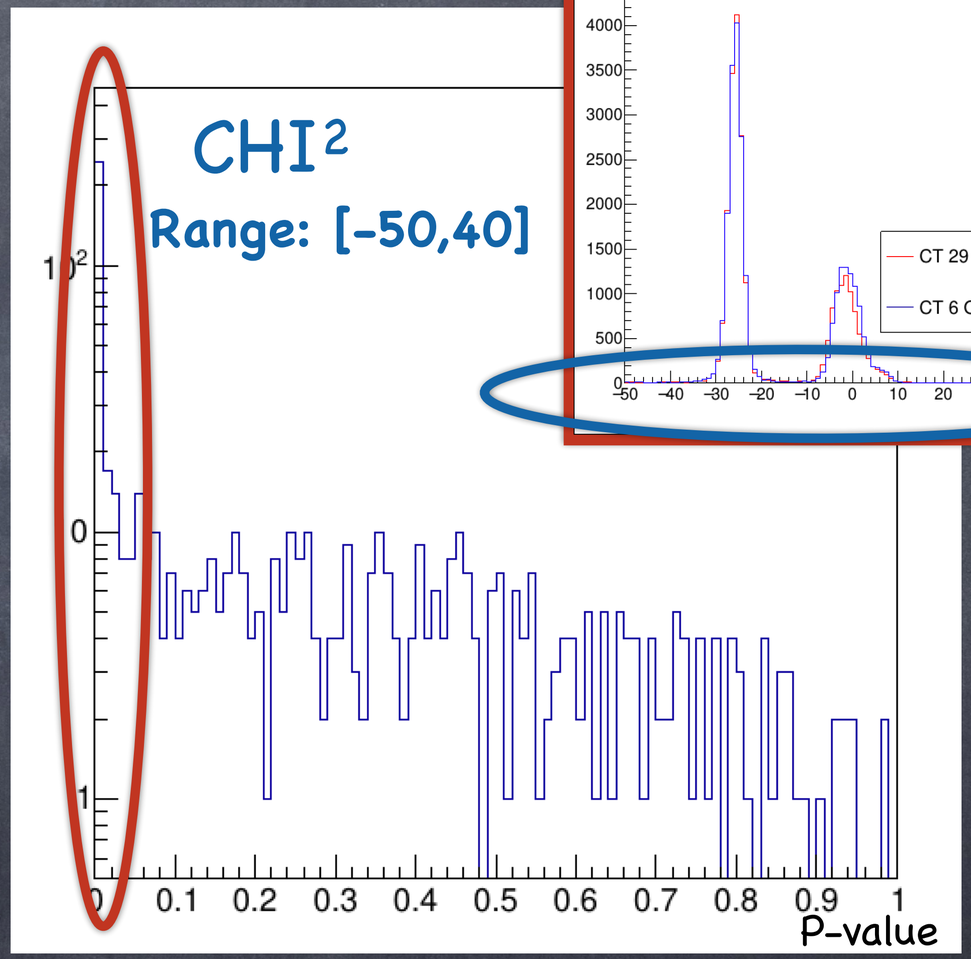

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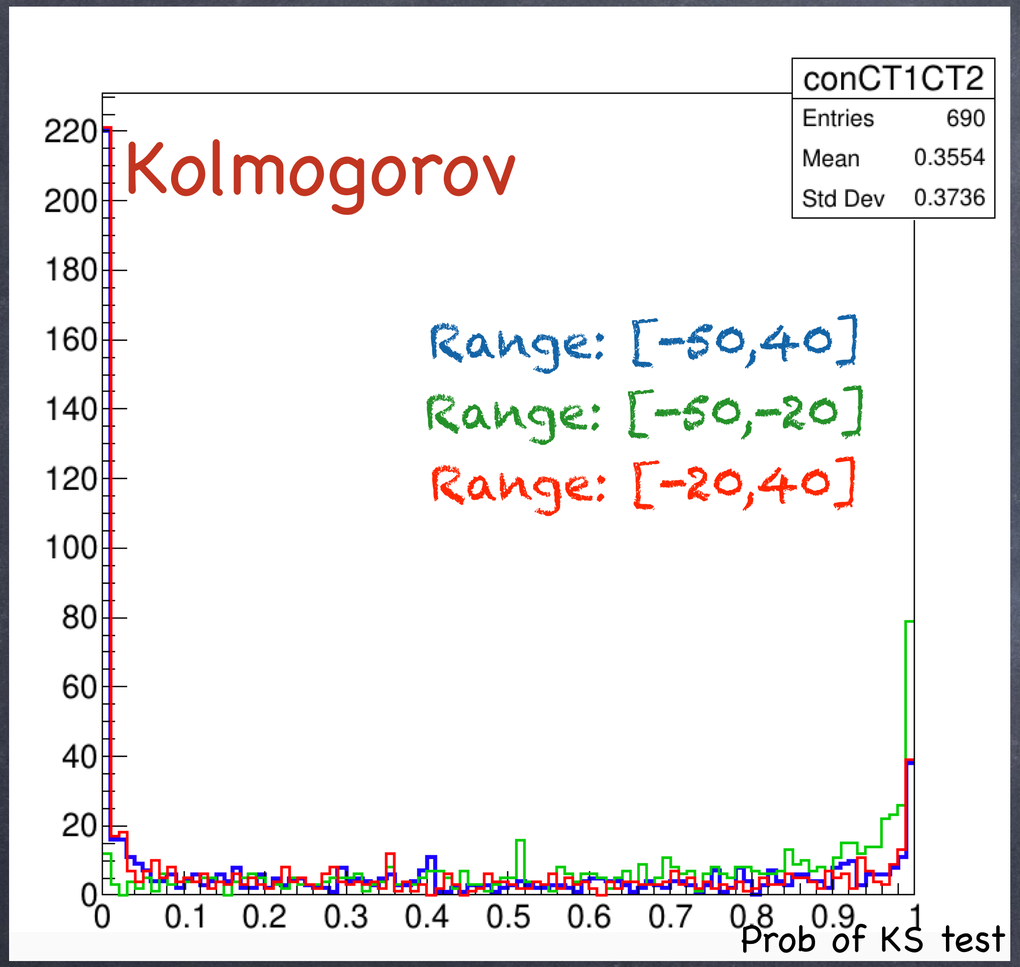

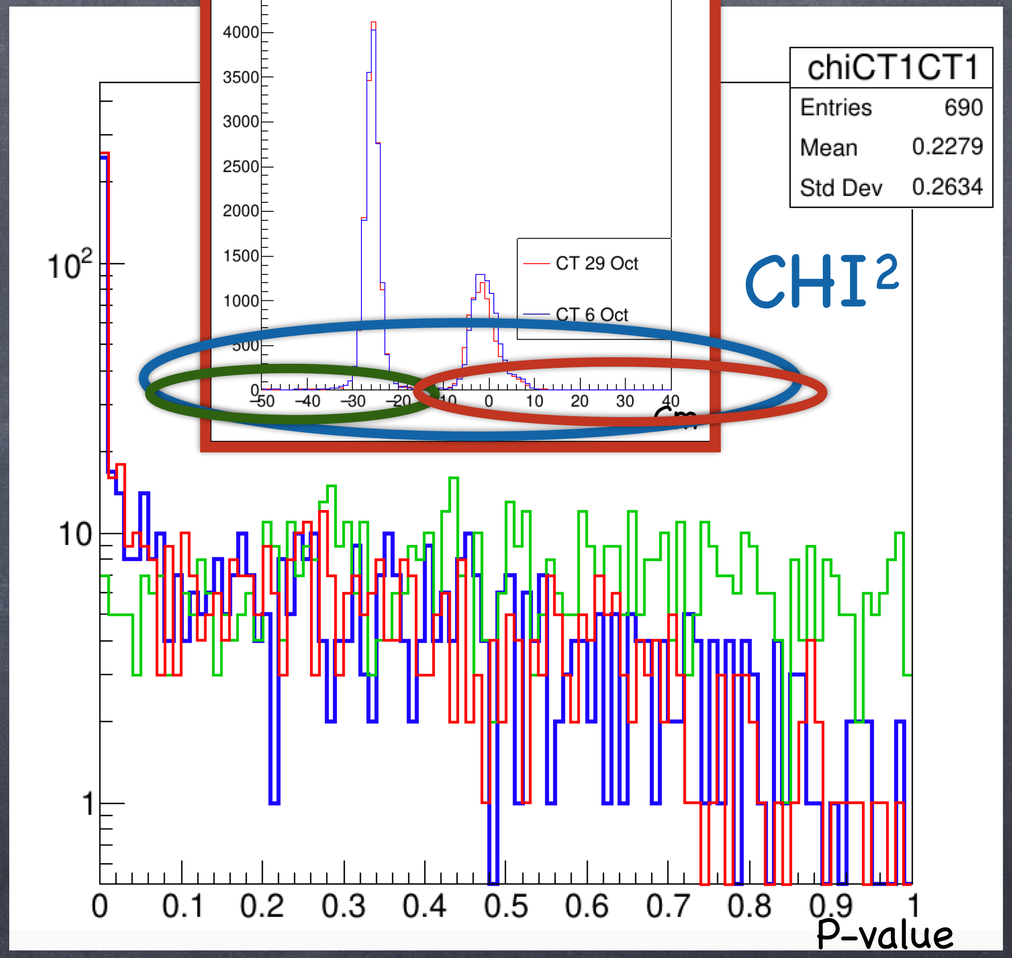

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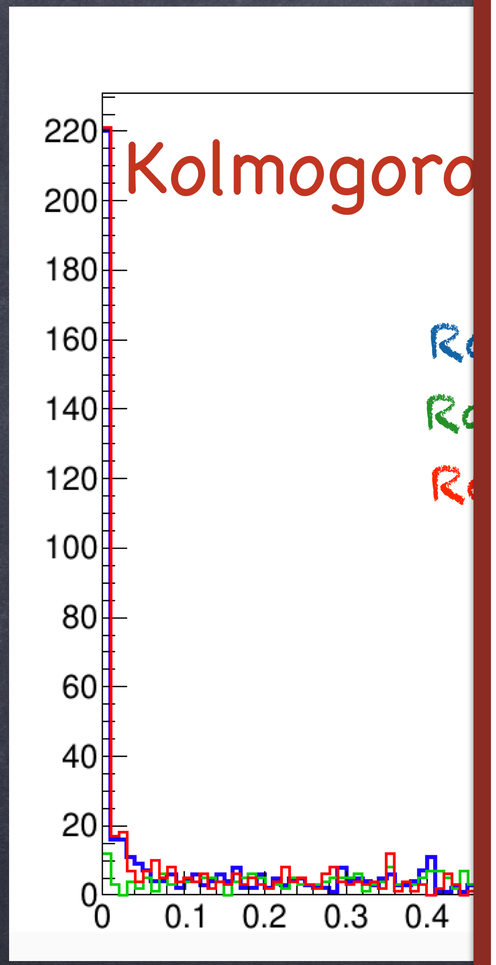

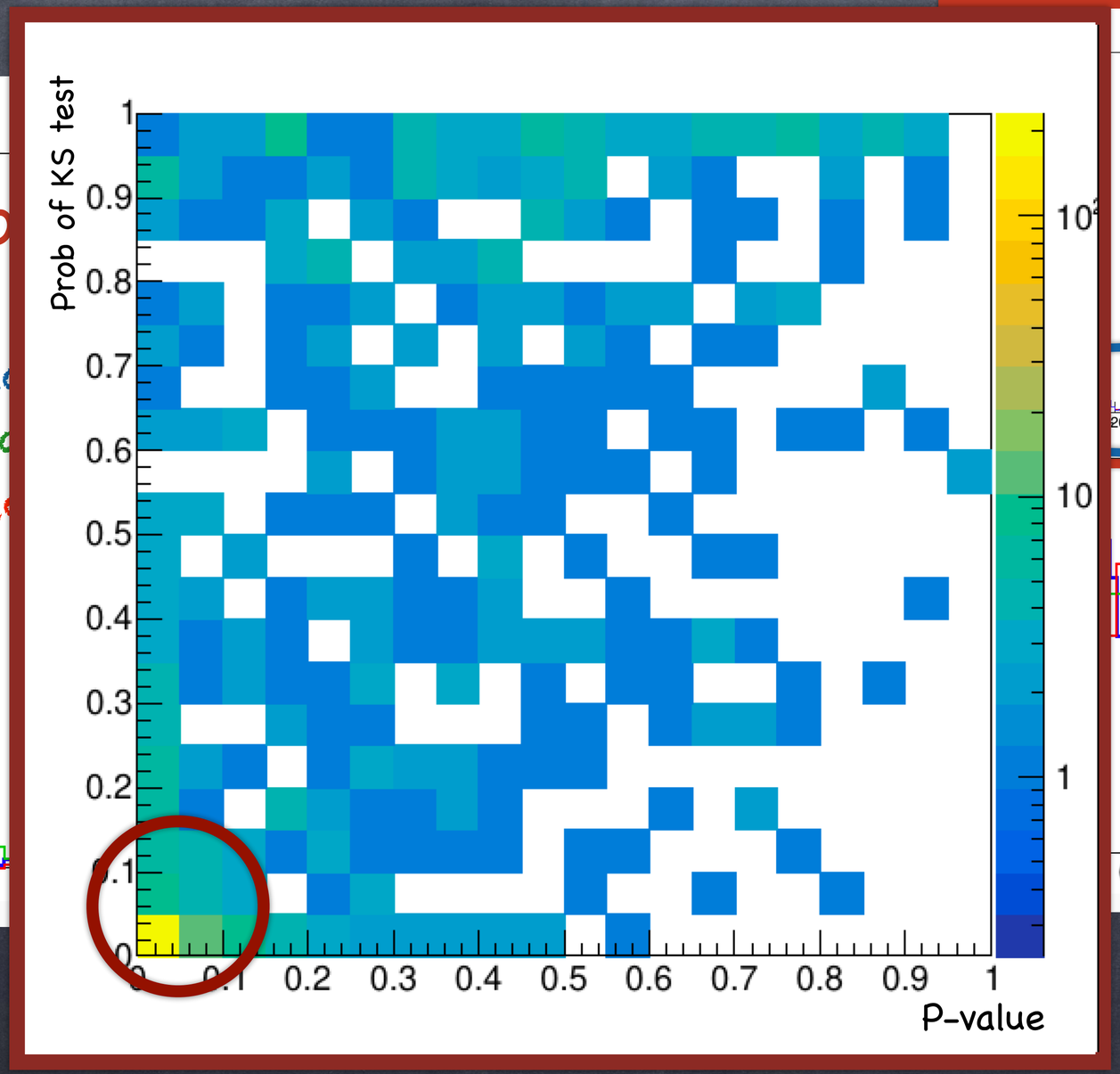

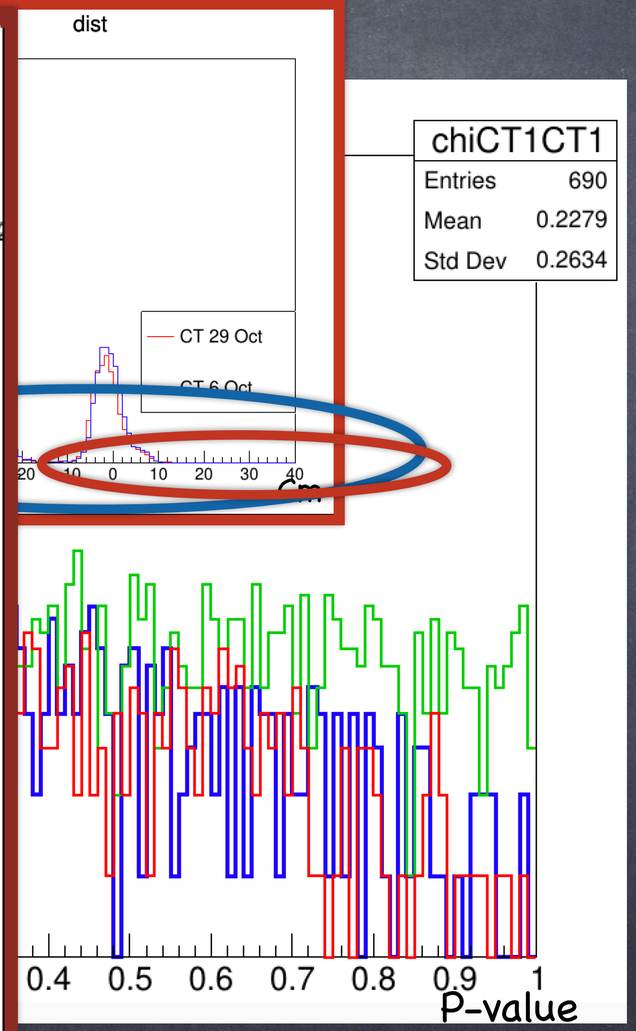

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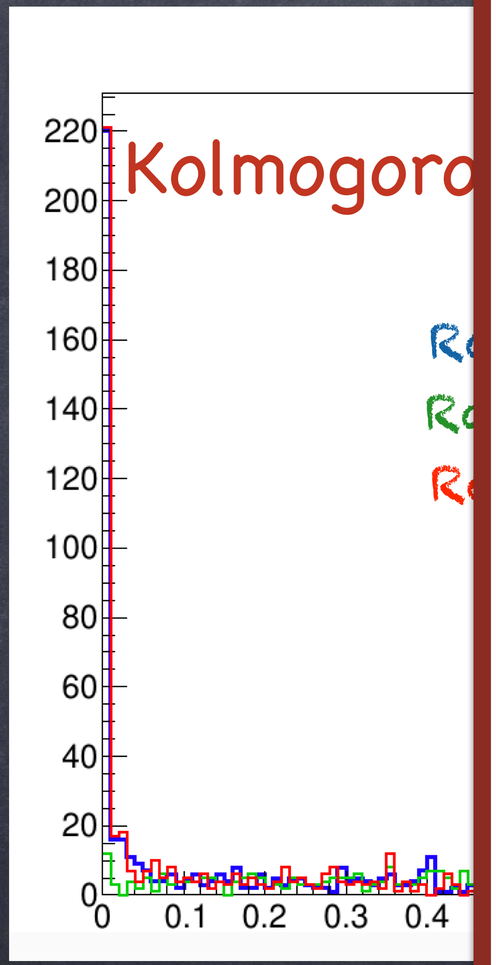
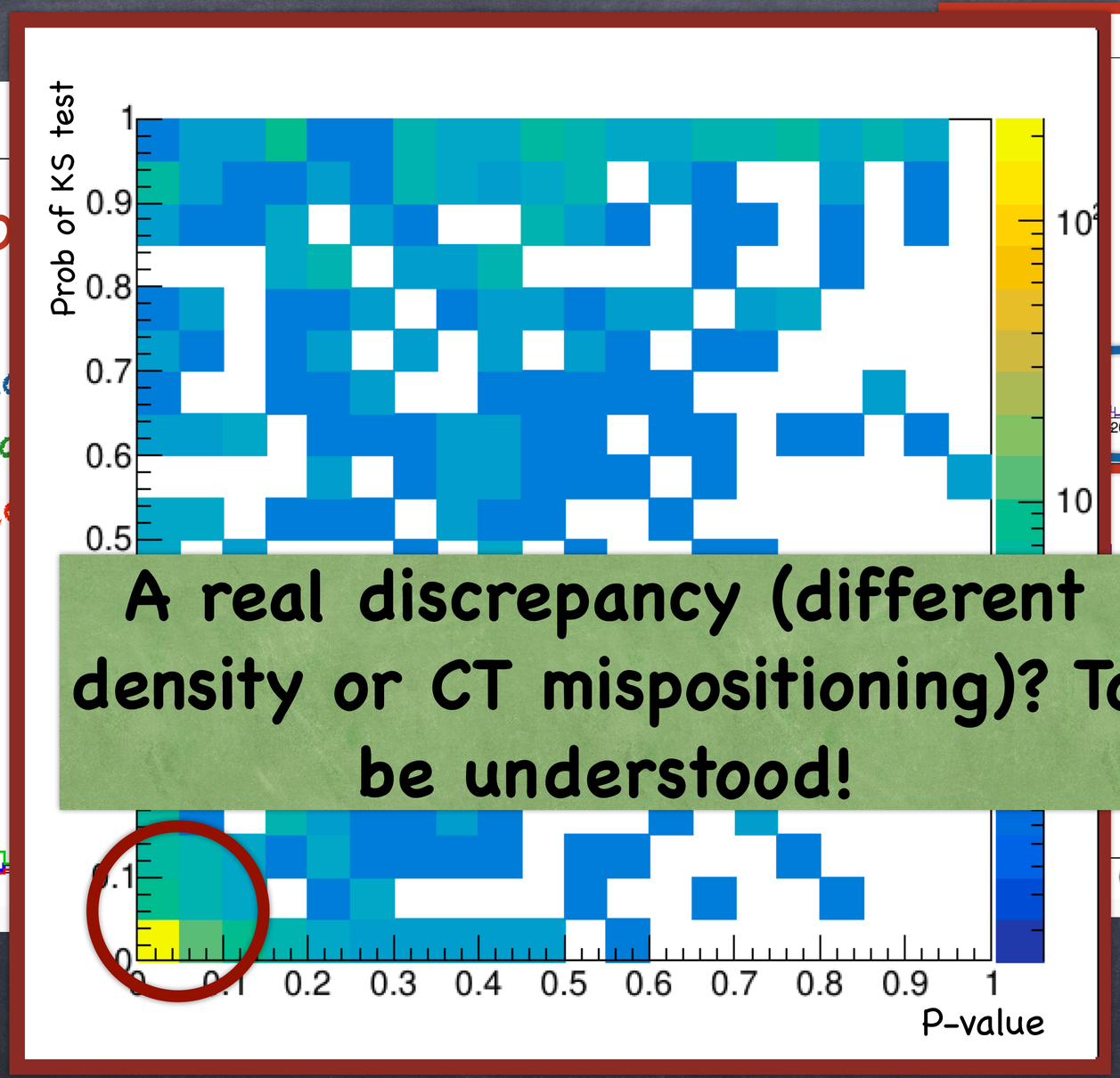
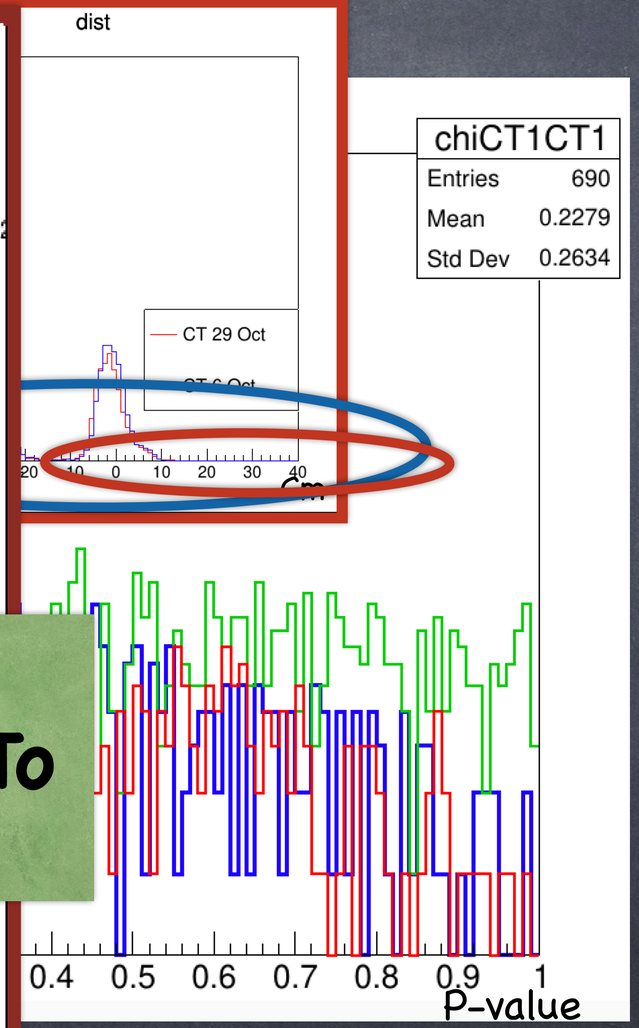
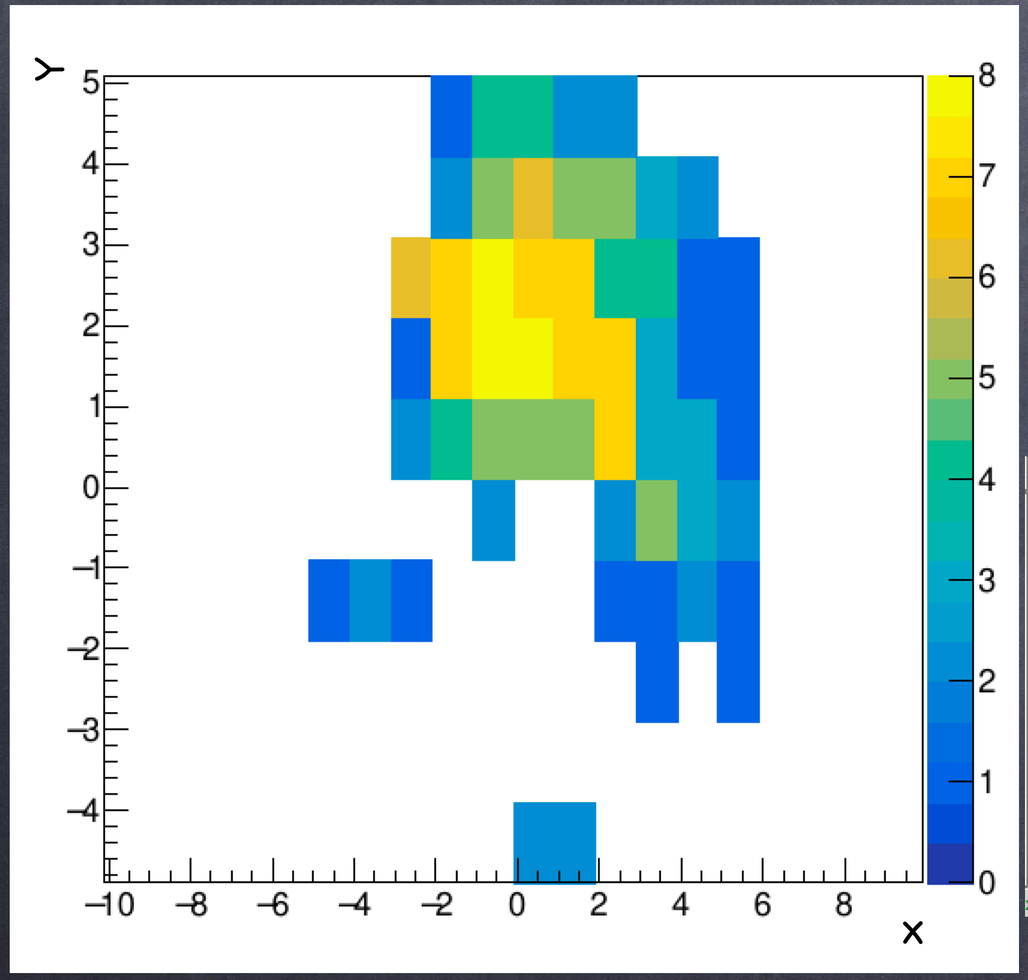
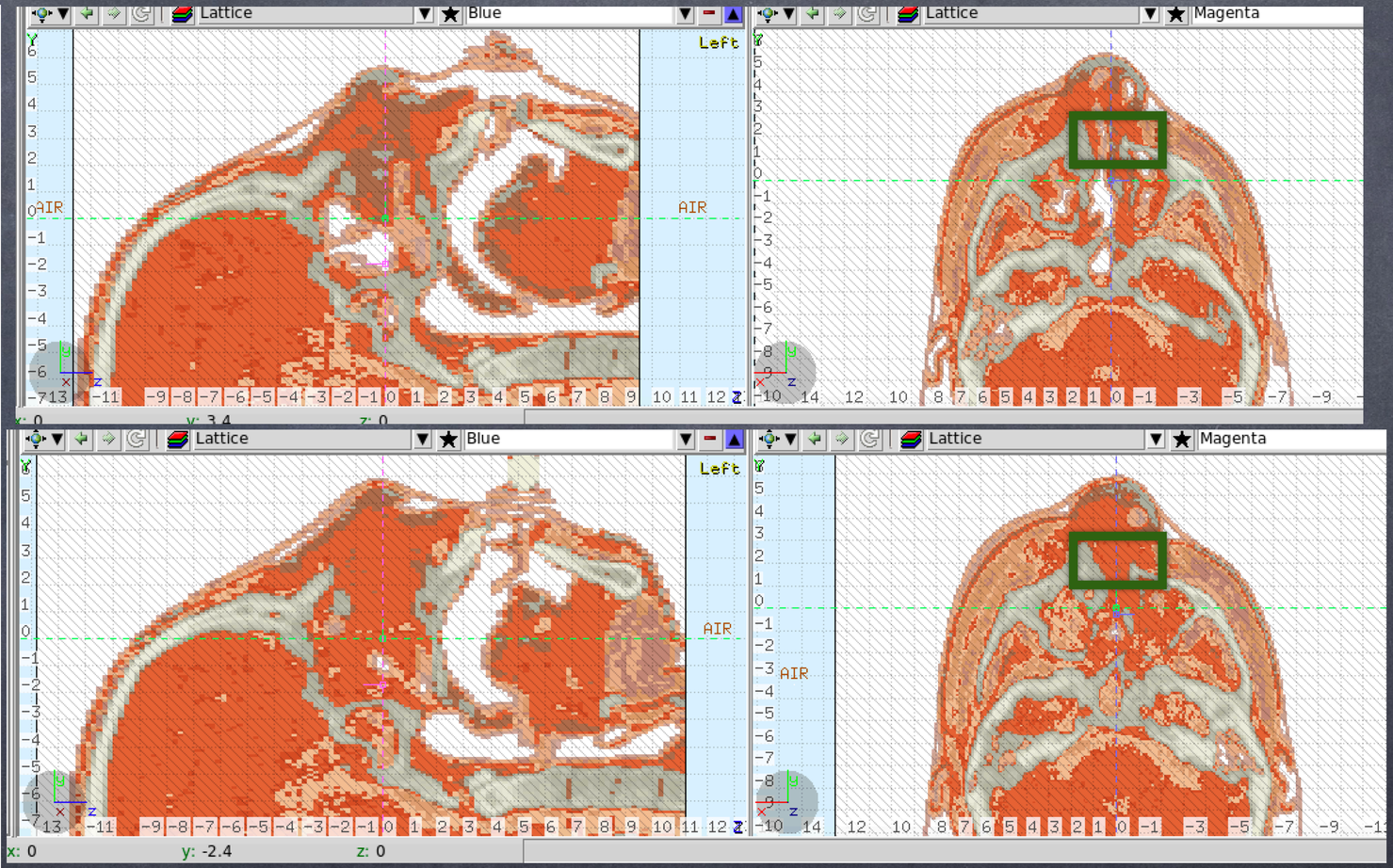






Distribution of discrepant PB





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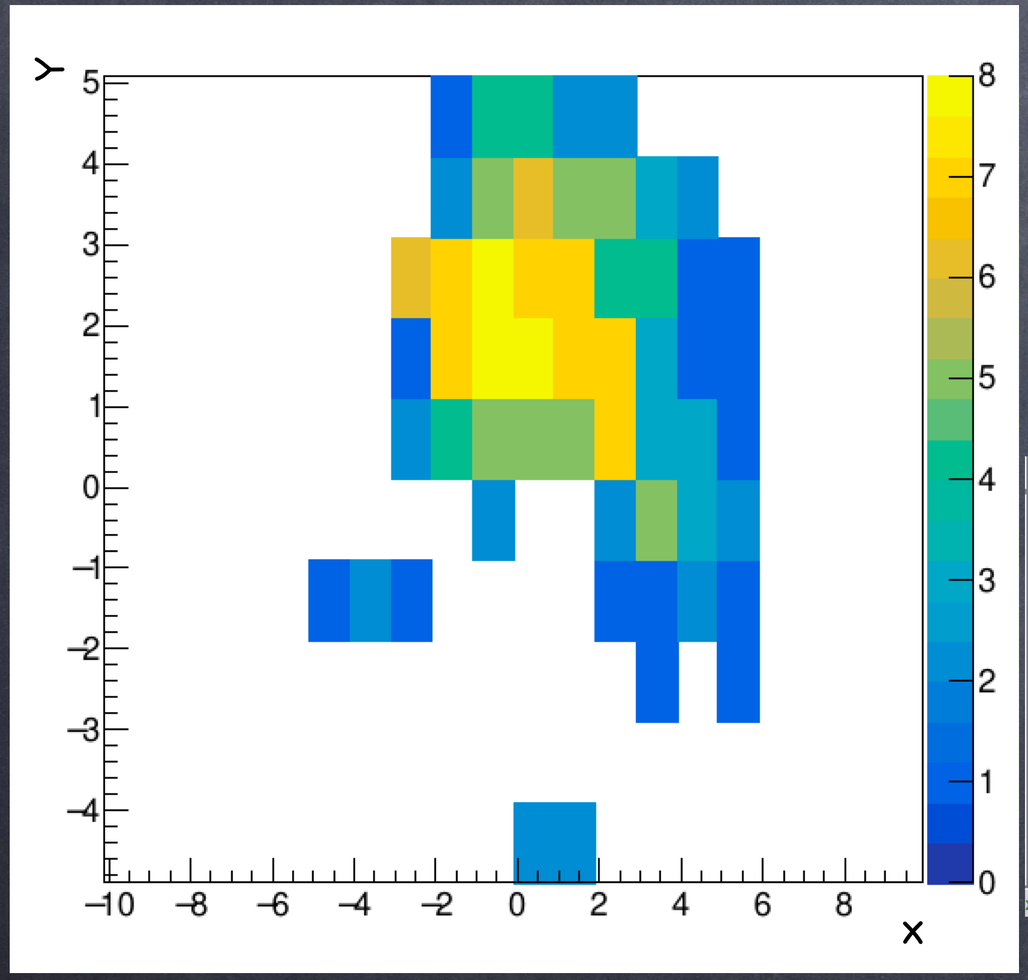

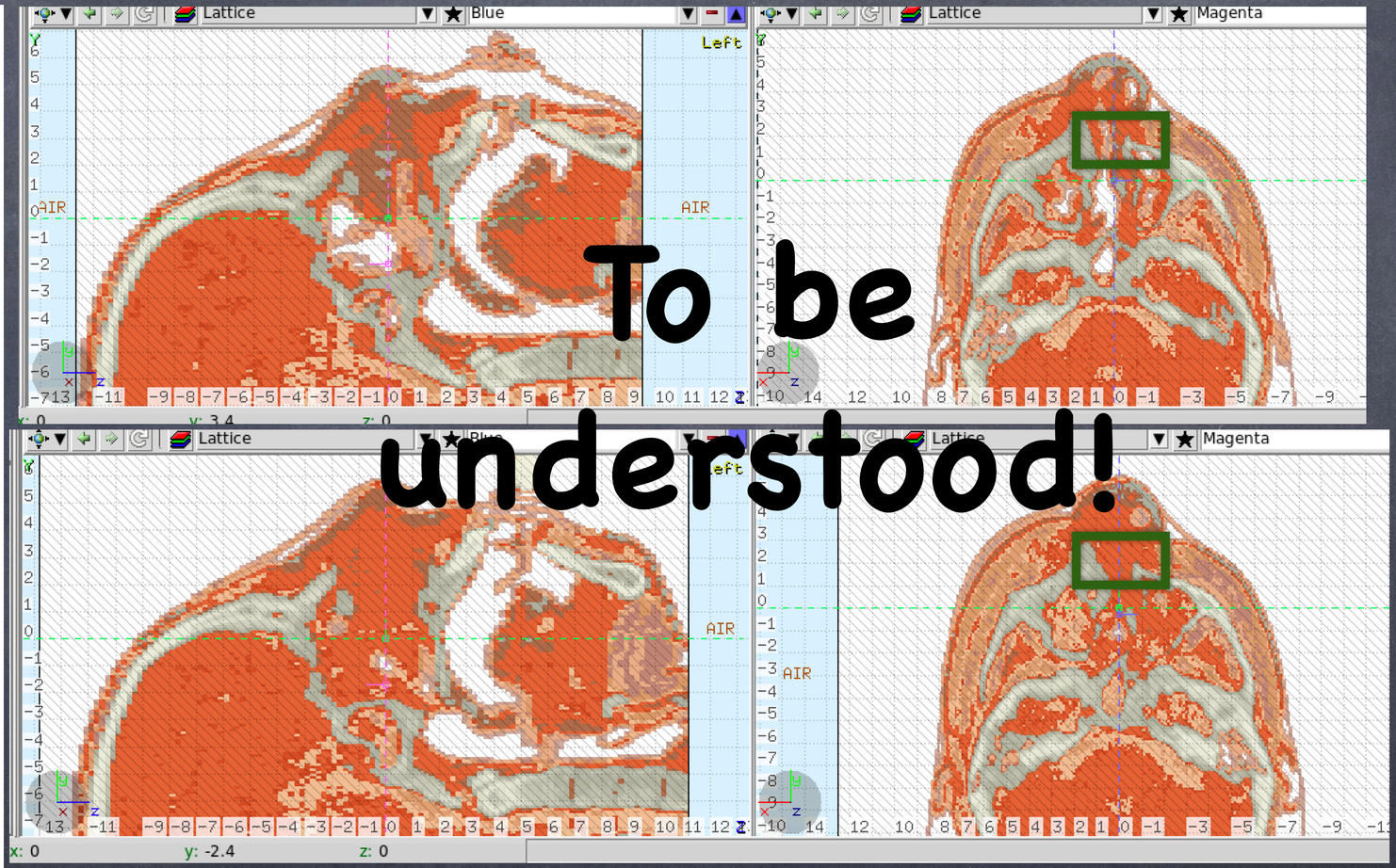

Next steps

- We need to investigate if there is a real discrepancy (different density or CT mis-positioning??)
- We need to study the 3D POCAs distribution
- Inter-fractional monitoring + test beam @ nov: if we're fast enough could be a paper for the IEEE-TRPMS Special Topic on Particle Therapy

Thanks