

Partitioning

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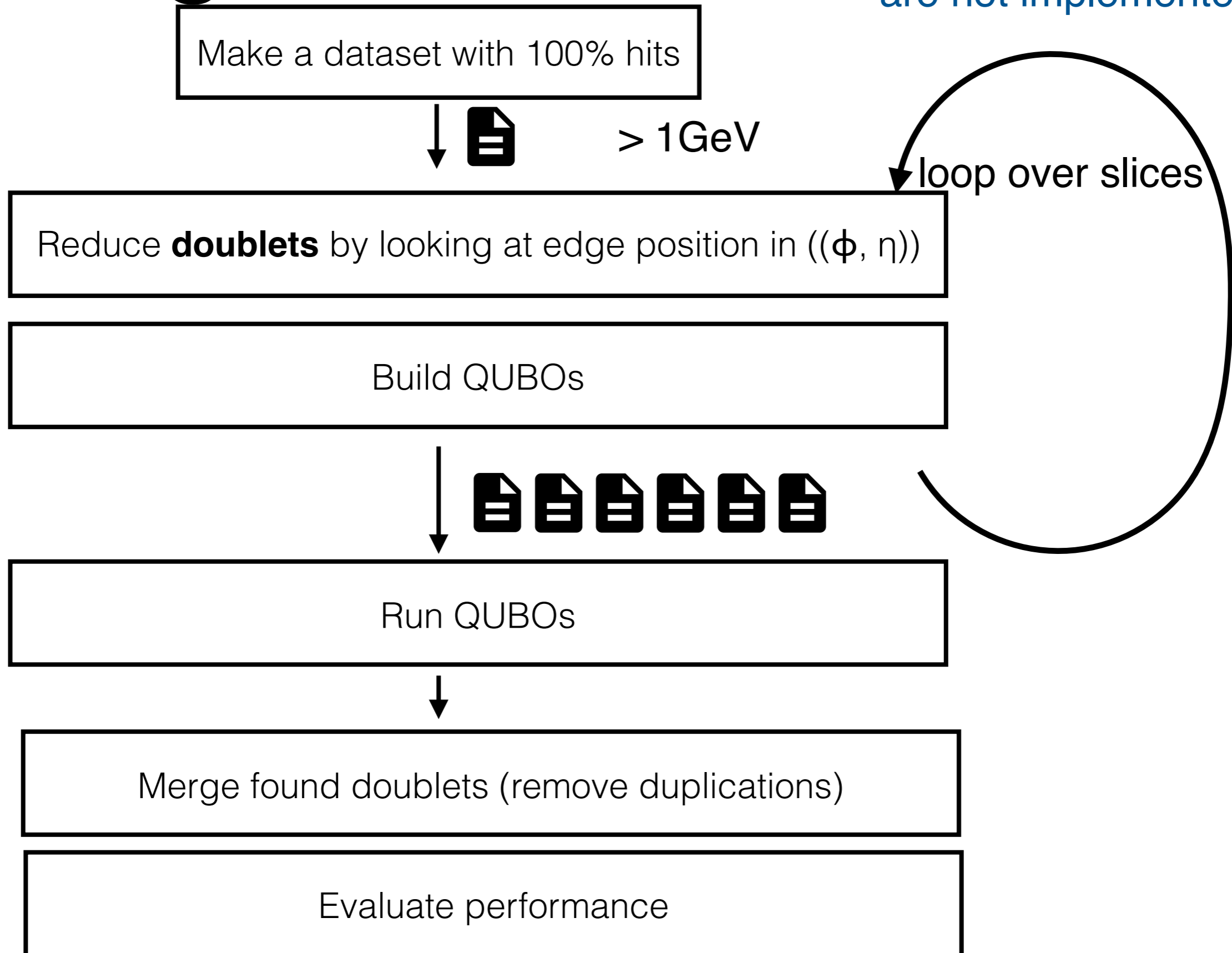
ICEPP, University of Tokyo

Motivation and goal

- Motivation
 - It would be interesting to measure the efficiency and purity with a similar density of particles to the HL-LHC
 - But the problem could be too large if we use 100% hits
 - → split a problem into slices in (ϕ, η) and merge later.
- Goal
 - Major the performance, i.e. efficiency, purity and speed, with 100% hits.

Design

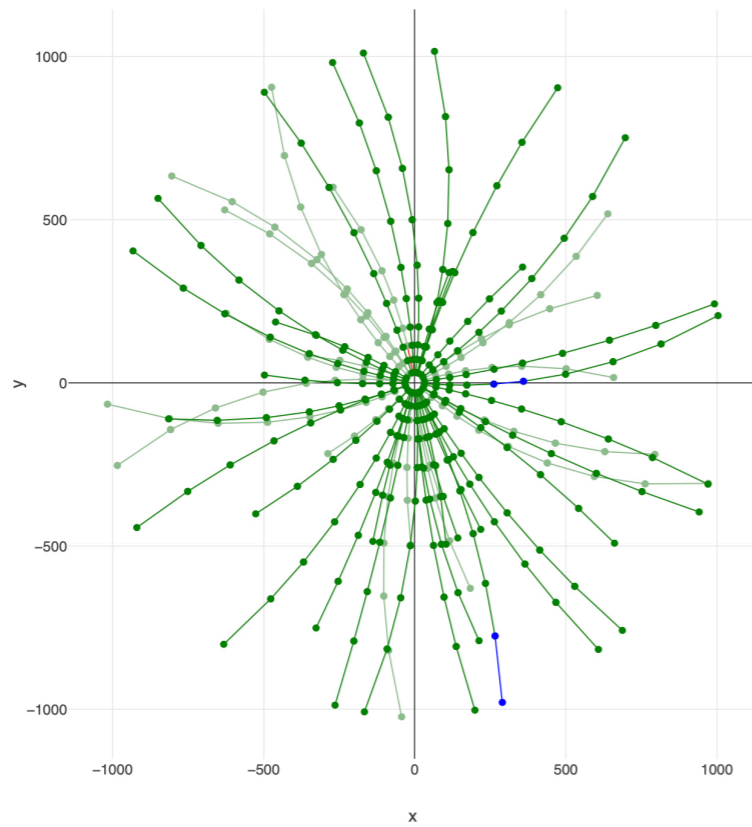
status: iteration and merging are not implemented yet



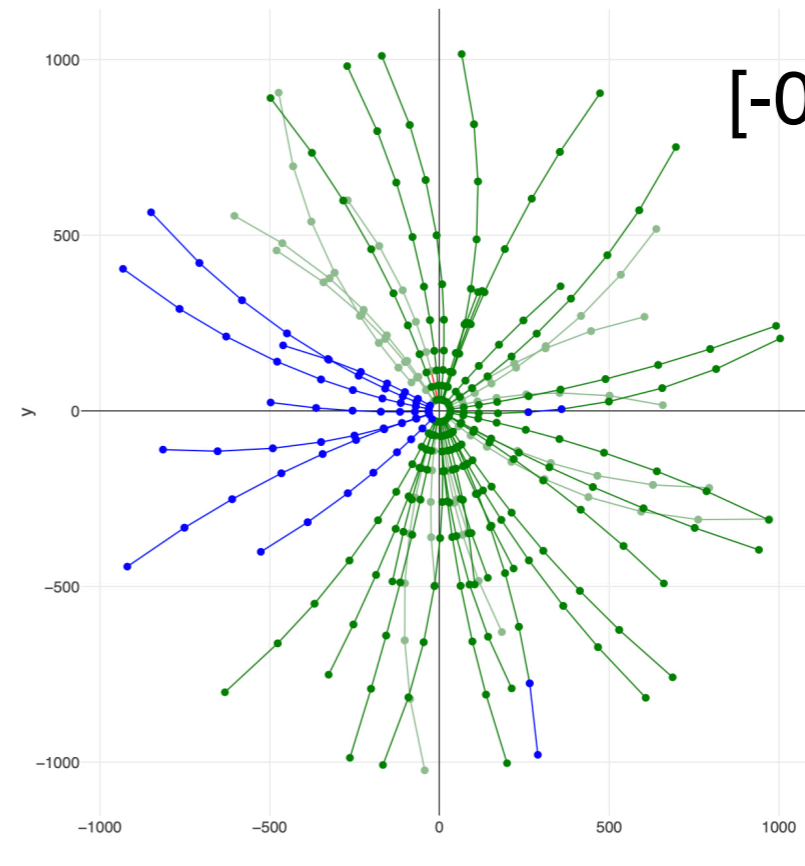
Sanity check (ϕ)

10% dataset

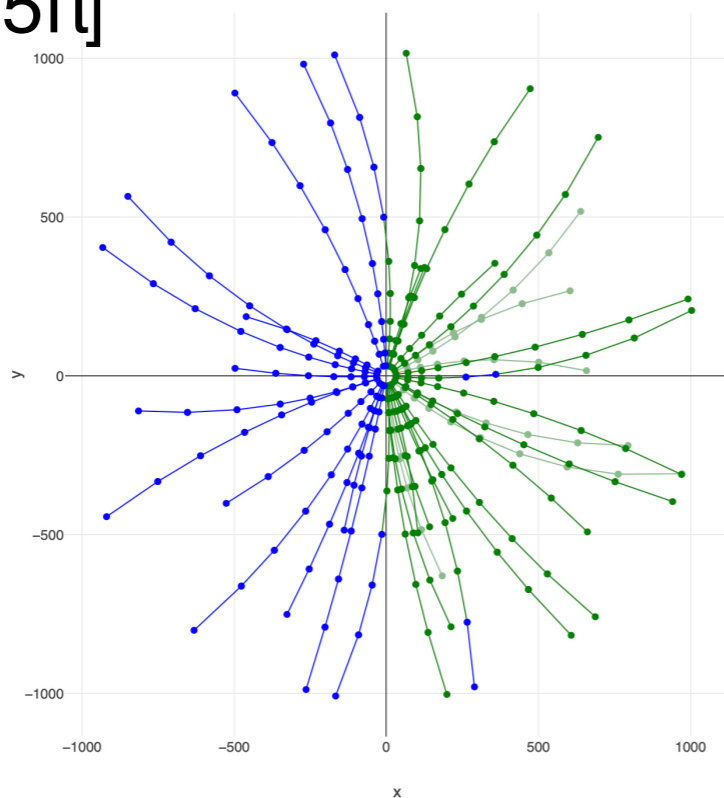
$[-\pi, +\pi]$



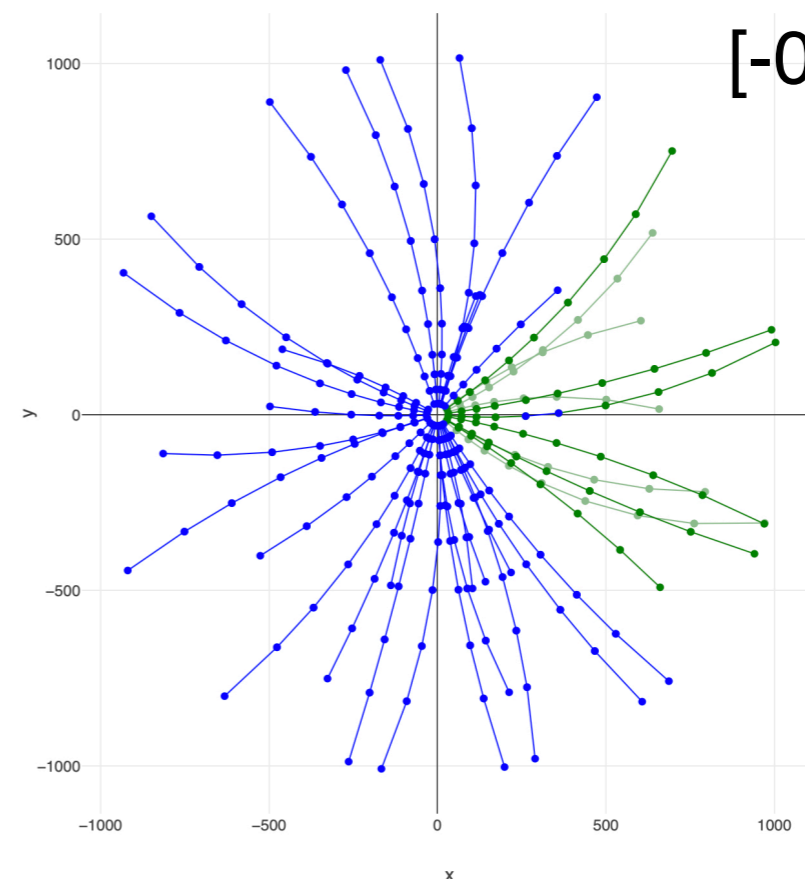
$[-0.75\pi, +0.75\pi]$



$[-0.5\pi, +0.5\pi]$



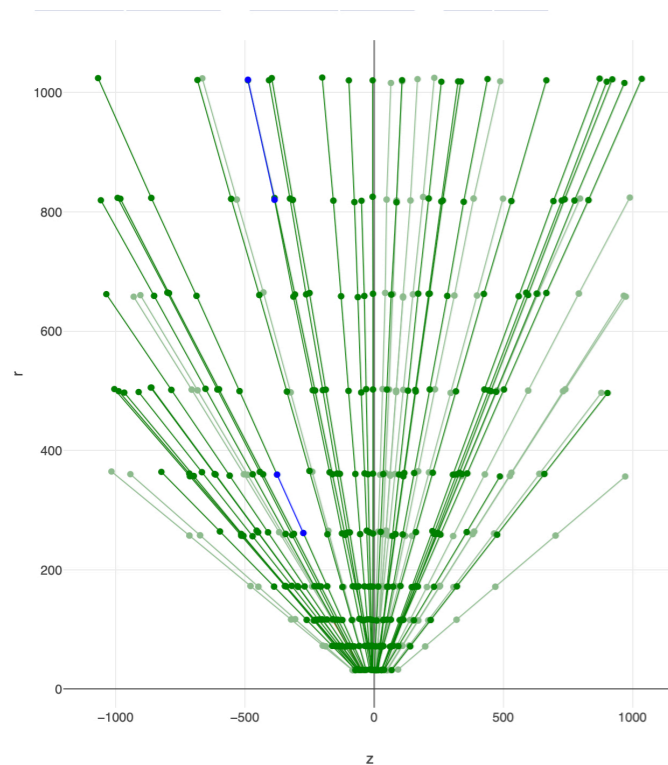
$[-0.25\pi, +0.25\pi]$



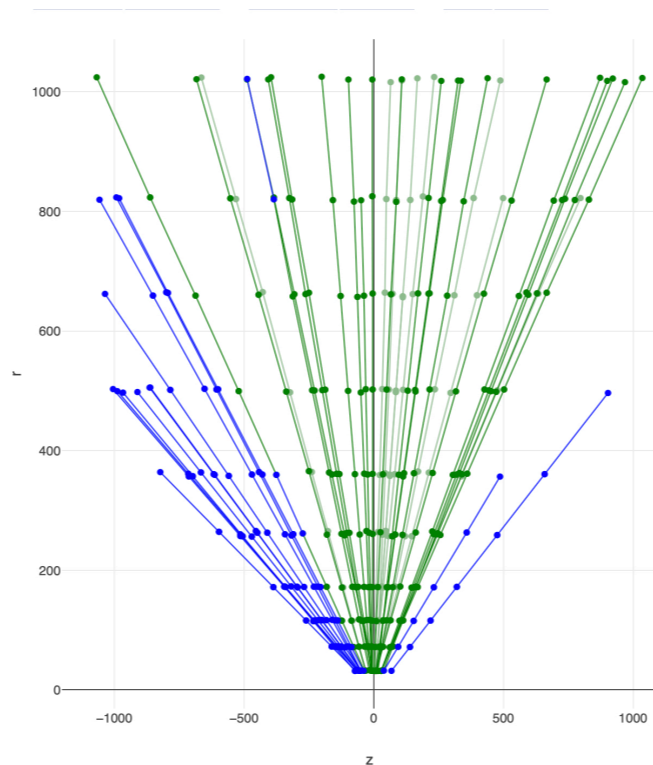
Sanity check (η)

10% dataset

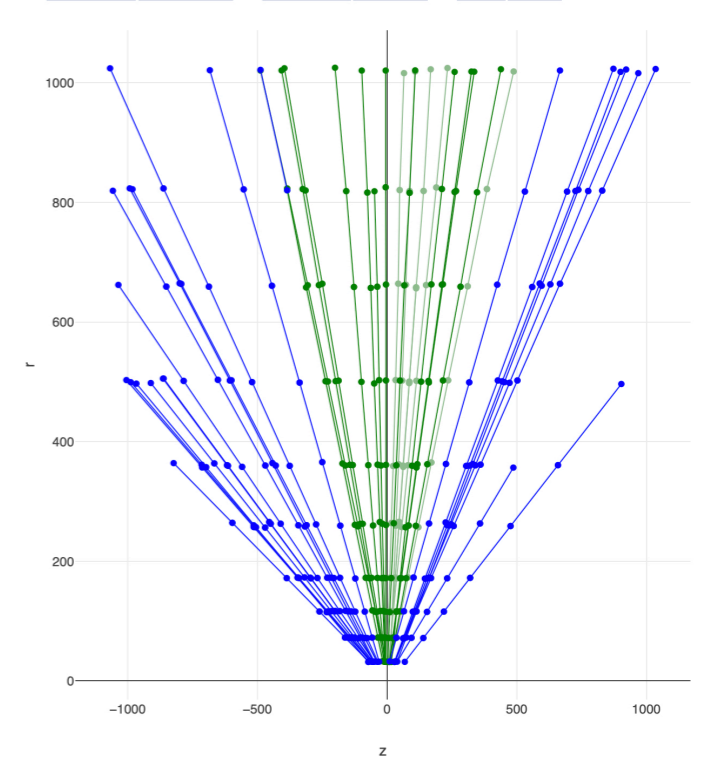
[-10, +10]



[-1, +1]



[-0.5, +0.5]

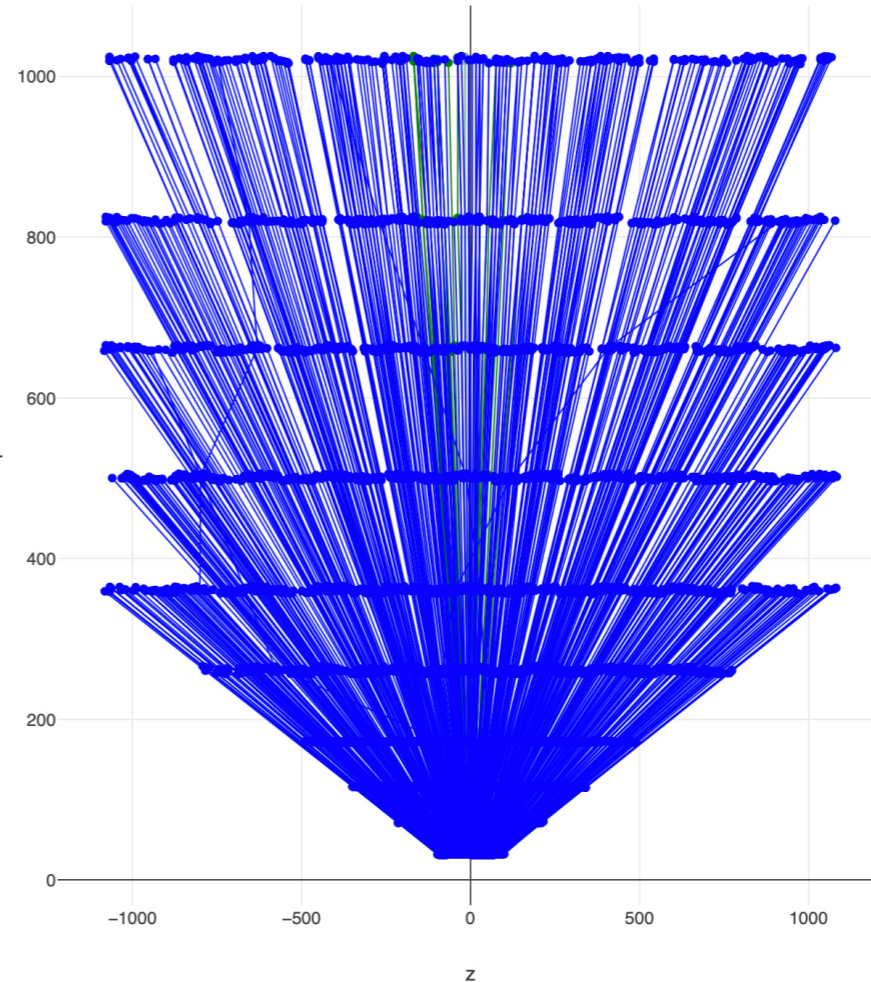
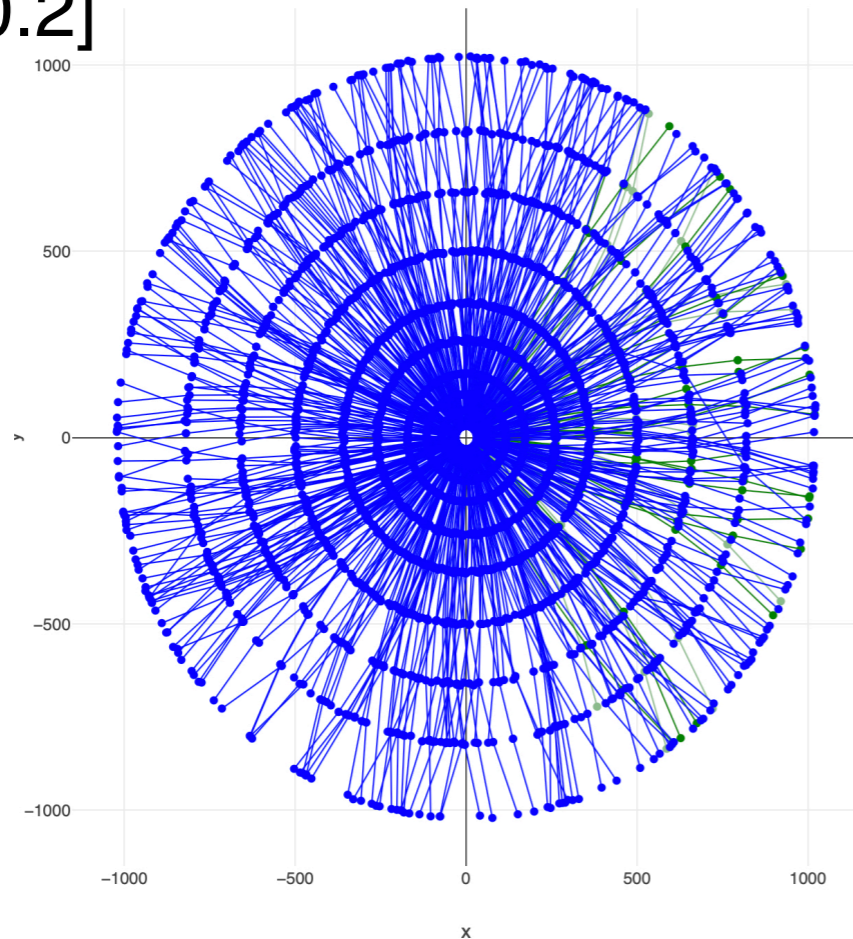


Maybe I should use different colour for true doubles outside of RoI.

Test with 100% dataset

ϕ : $[-1/3\pi, +1/3\pi]$

η : $[-0.2, 0.2]$



Doublet : 302540

Triplets : 287097

QUBO size : 5982

→ corresponds to ~20% in the full region.

Precision : 97.8%

Recall : 84.0%

Low efficiency and purity due to the high multiplicity or edge effect ?

Update since yesterday

- Implementation done (in a dirty way...)
 - Multiple QUBO (pickle) outputs over slices
 - Combining found doublets from multiple QUBO runs
 - Evaluation of performance on the combined results
- Changed slices
 - Single slice for ϕ
 - η slice by a width of 0.1 with overlaps
- Test results with 10% dataset
 - Purity ~~~90%~~ **99.5**
 - Efficiency ~~~95%~~ (low ?) **95.1**
- Now 100% dataset is running

ToDo

- Validation
- Configuration
- Speed up

- Check performance as a function of density

- Try running on DW