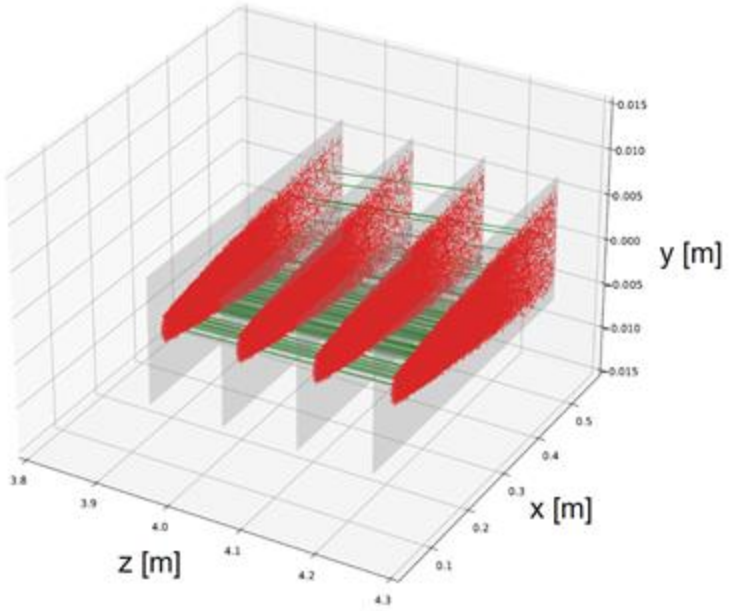
# Track Reconstruction (LUXE)

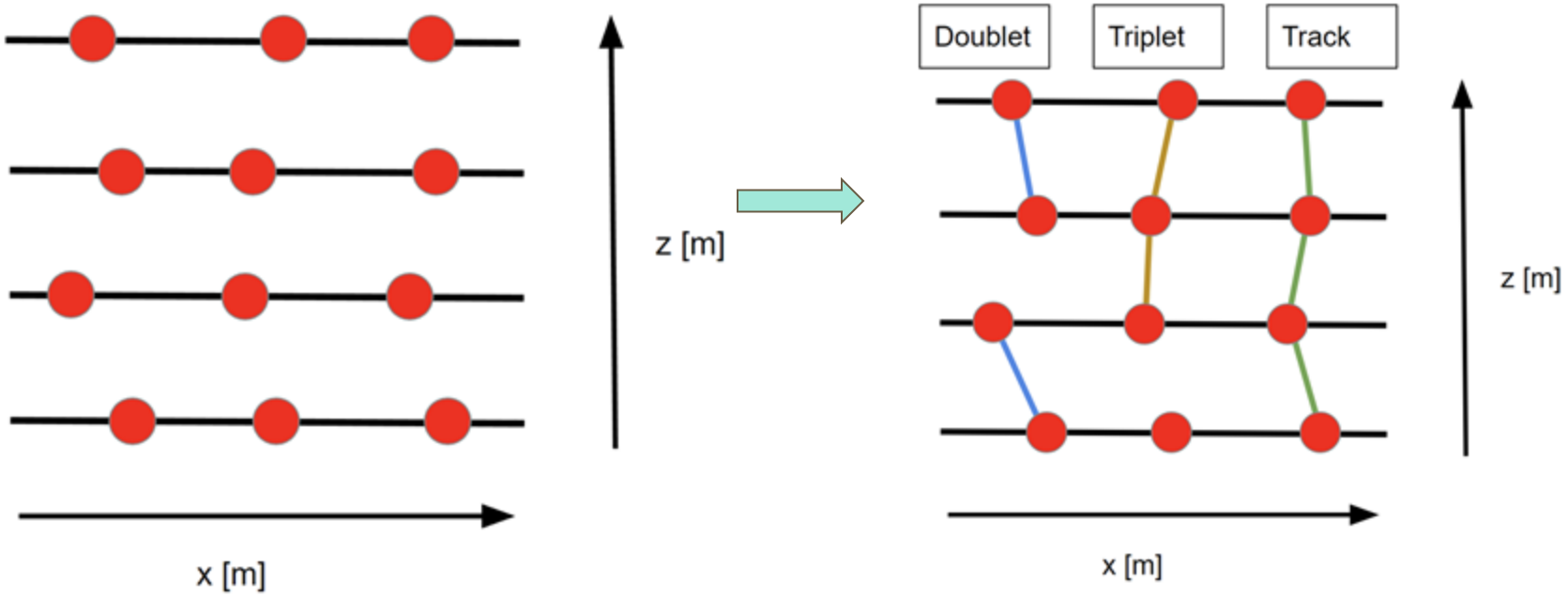
Week 20-31 July

# Track Reconstruction

- Connecting Hits which belong to actual physical track
- Example – 141 particles. (141 hits per layer)



# Generating track candidates

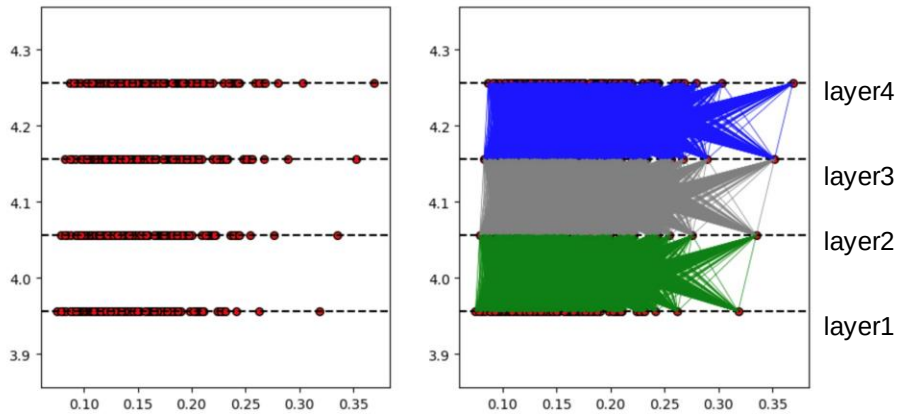


# Some Combinatorics(# doublets)

- Total numbers of doublets
- (N1*N2)+(N2*N3)+(N3*N4)

- Eg – 141 hits per layer
- 3*(141*141) = 59643

```
Brute-Force creation of all doublets
Number of correct doublets: 423
Number of all doublets: 59643
```

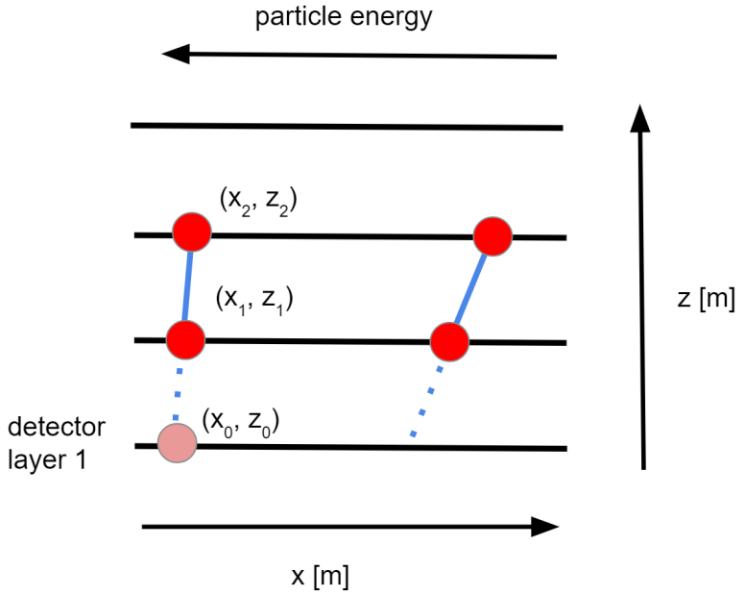


# Some combinatorics(# triplets)

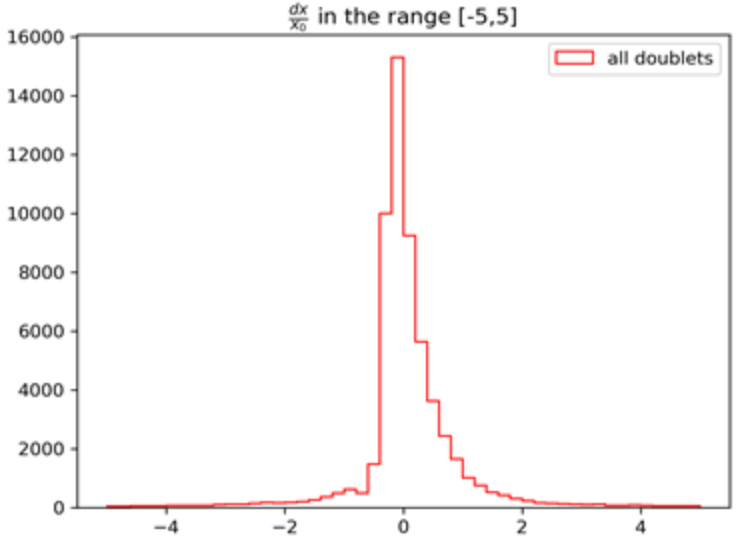
- N1N2N3 + N2N3N4
- Eg (141 hits )- 5.6 million

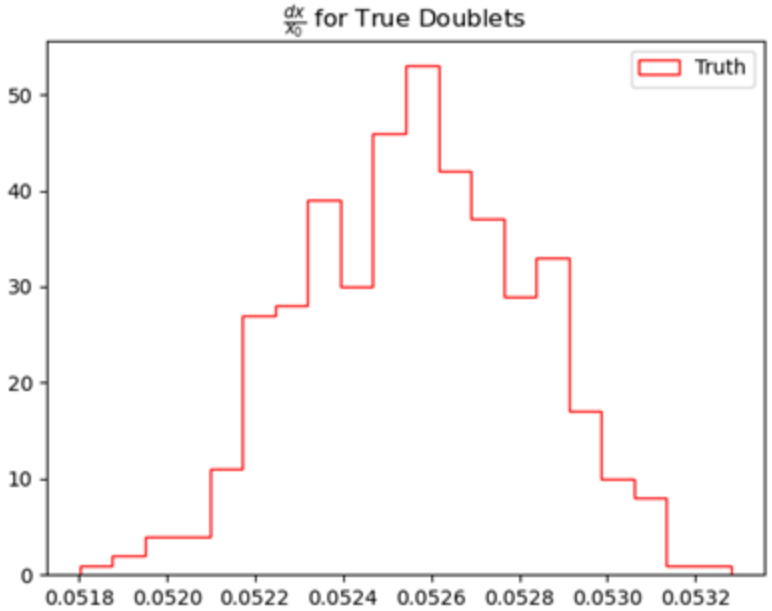
# STEP 1 - Reducing # combinatorics

- Mapping each doublet to IP
- Calculating $dx/x_0$

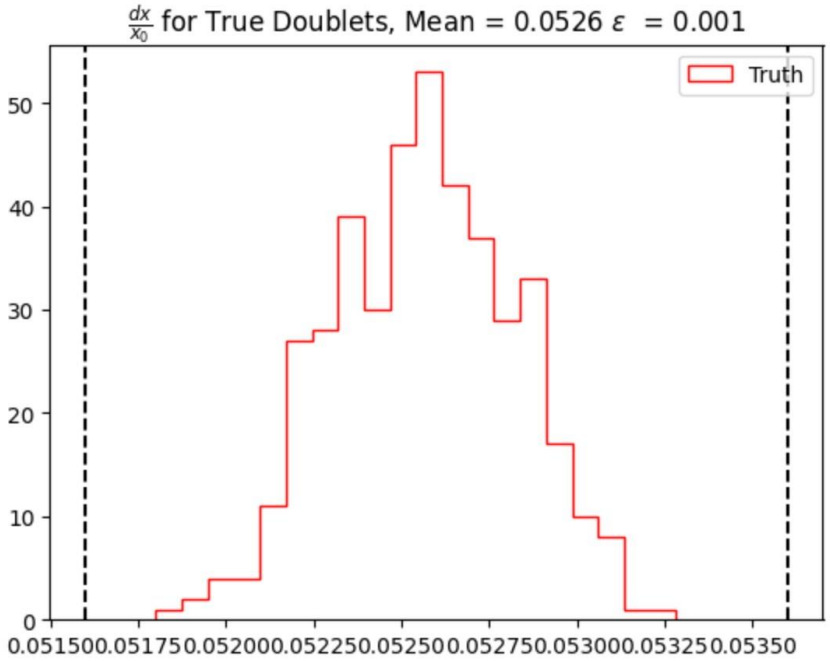


# First Cut on the basis of $dx/x_0$



# Applying $dx/x_0$ Cut

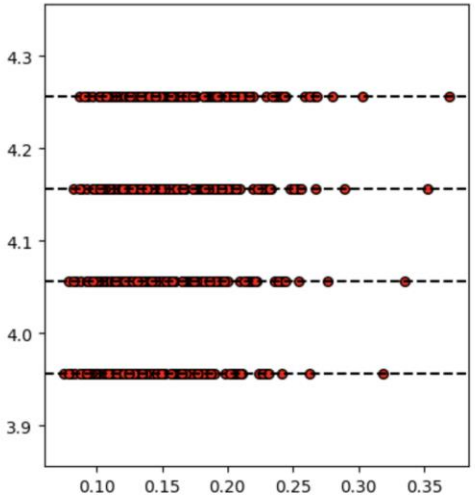


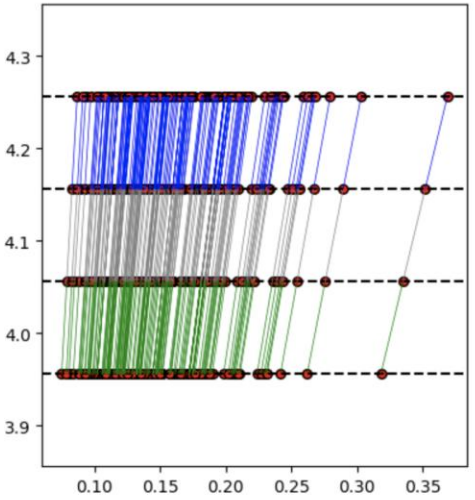
# Reduction in #doublets

99.15% reduction in total number of doublets

```
Brute-Force creation of all doublets
Number of correct doublets: 423
Number of all doublets: 59643
```

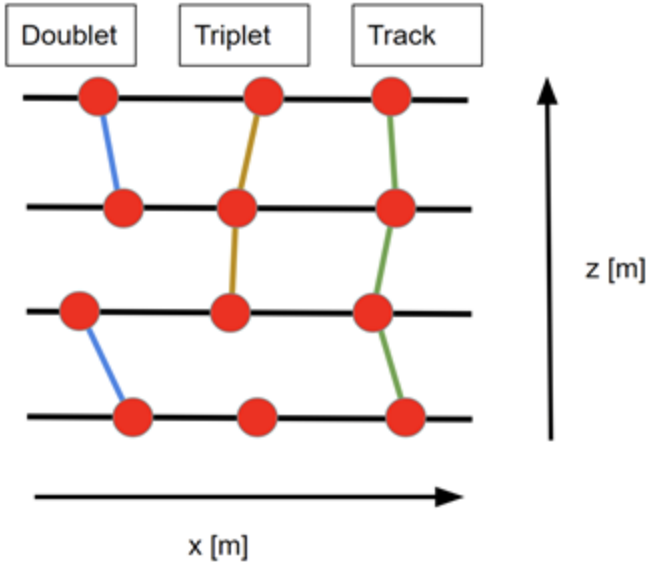
```
After removing unlikely combinations:
Number of correct doublets: 423
Number of all doublets: 506
```



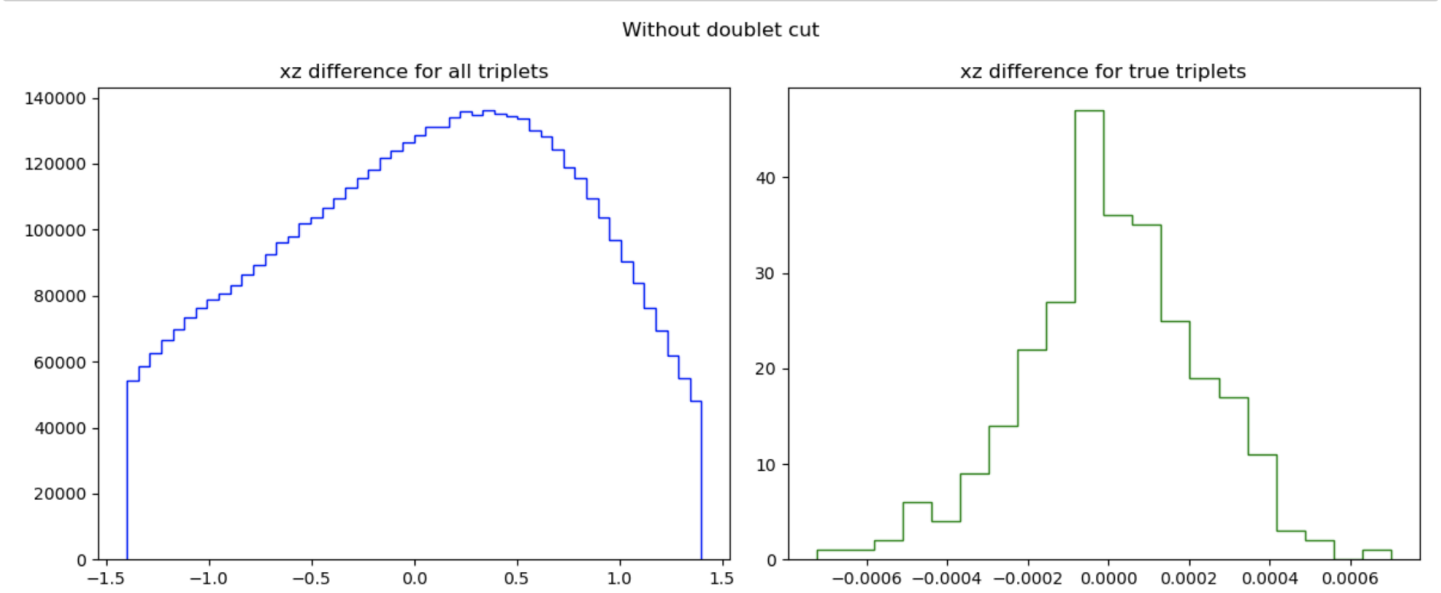



# Triplet Analysis

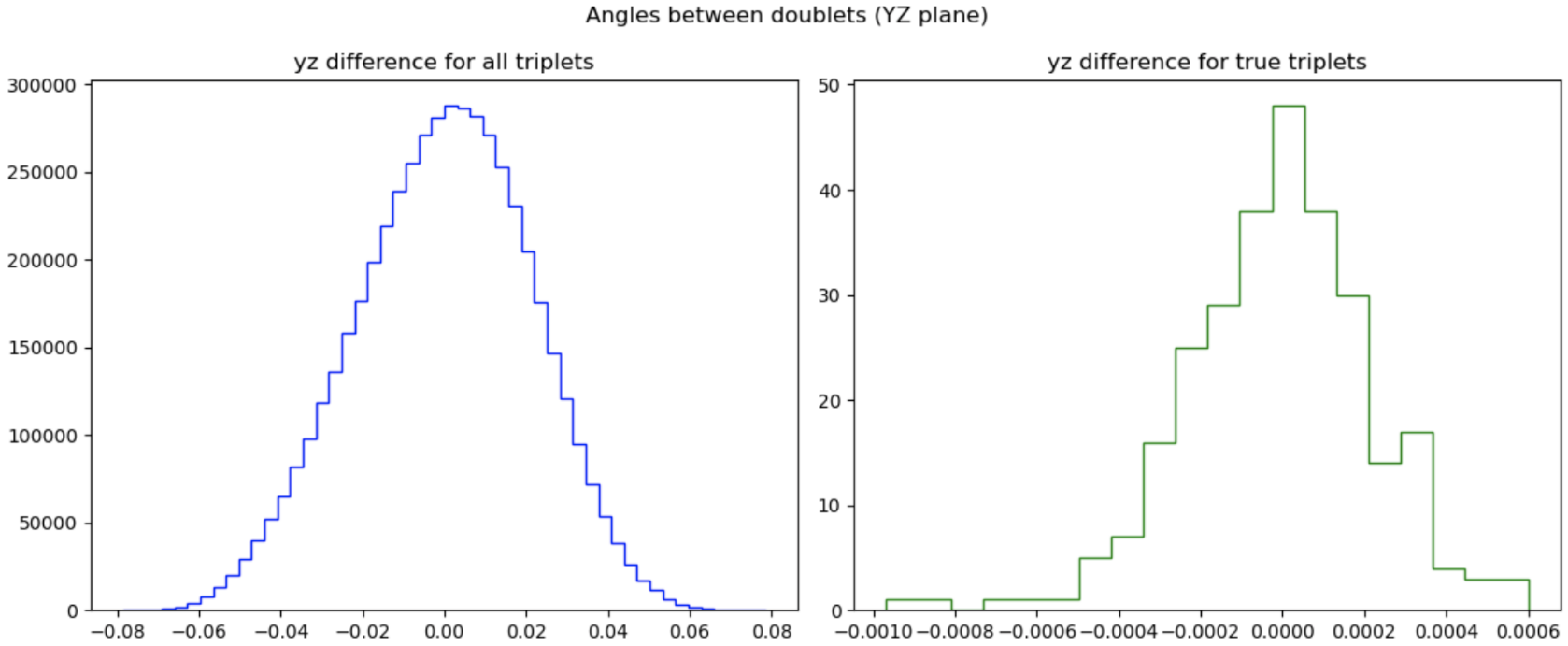
- Angle difference xz
- Angle difference yz



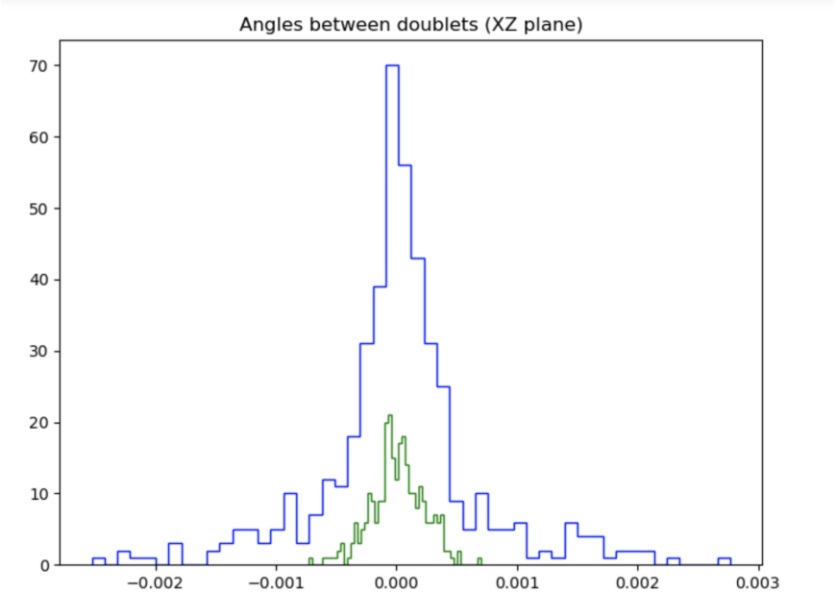
# For all triplets (Without Cut)



# YZ difference distribution



# Distribution after applying cut



# Processing for triplets and further steps

- After applying all the triplet cut, The problem is mapped as of binary optimization problem
- This optimization problem can be solved with quantum computer
- Currently I am going through how the Hamiltonian matrix is calculated and further steps.

Without Doublet Cut