Radius Optimization at CEPC

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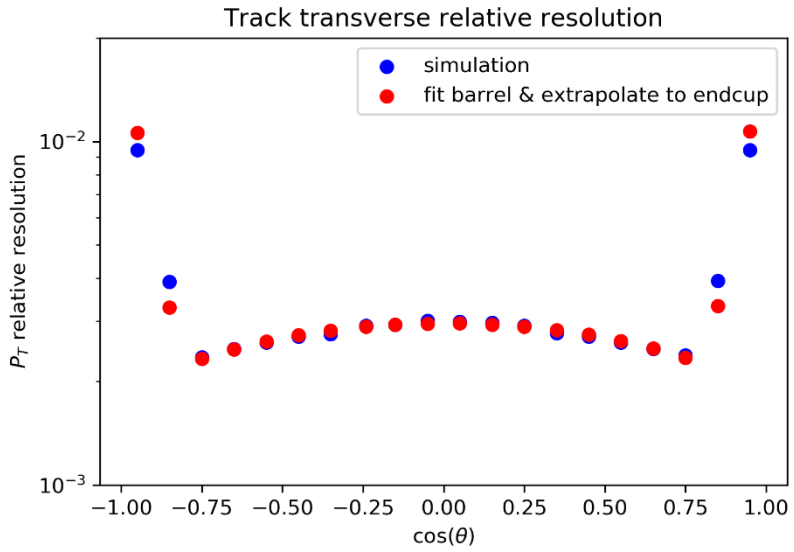
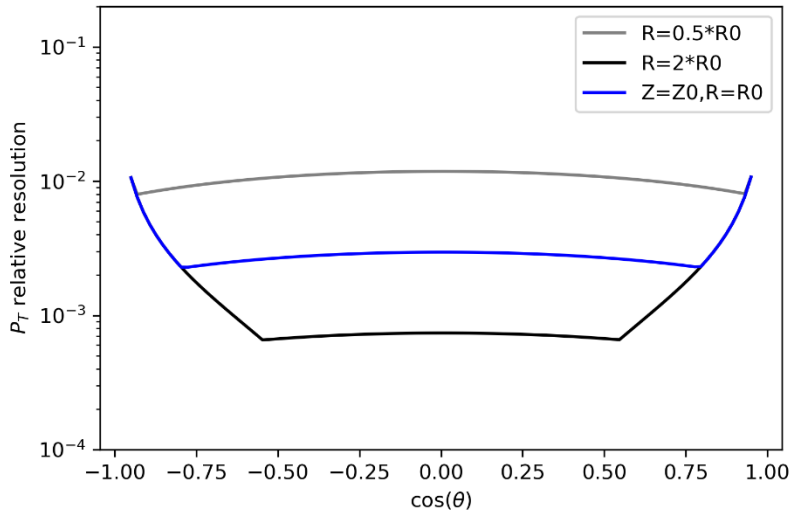
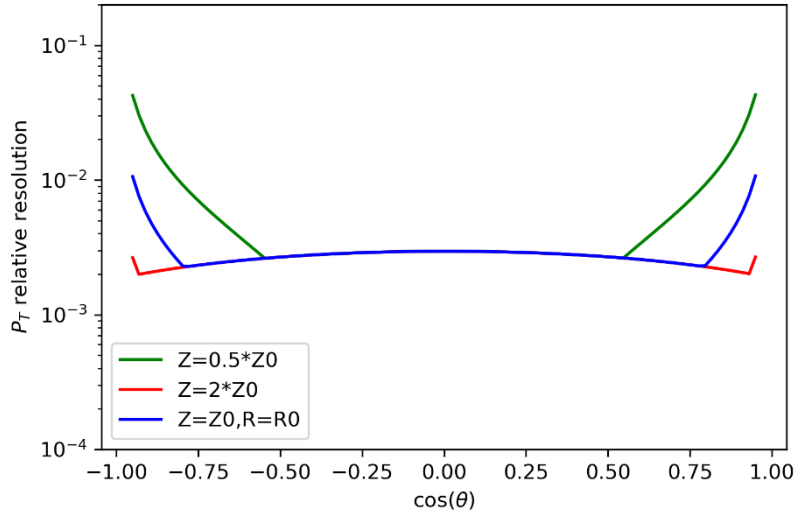
Track performance dependence on R and Z

- In the barrel, we fit the simulation result of $R_0 = 1.8\text{m}$
- We extrapolate the results to other R assuming track resolution is proportional to the inverse square of the radius of TPC.
- Then we extrapolate results to the end-cup and correct it with a scale factor $\frac{\tan^2(\theta_c)}{\tan^2(\theta)}$. This scale factor is from the assumption that track resolution is proportional to the square inverse the maximum radius of track in TPC.

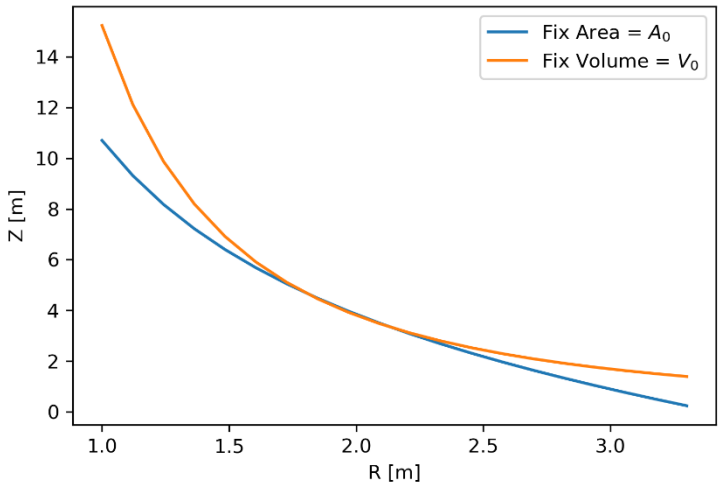


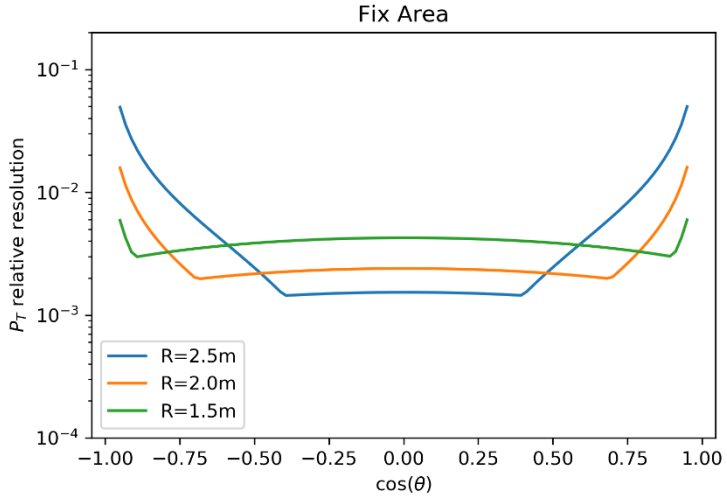


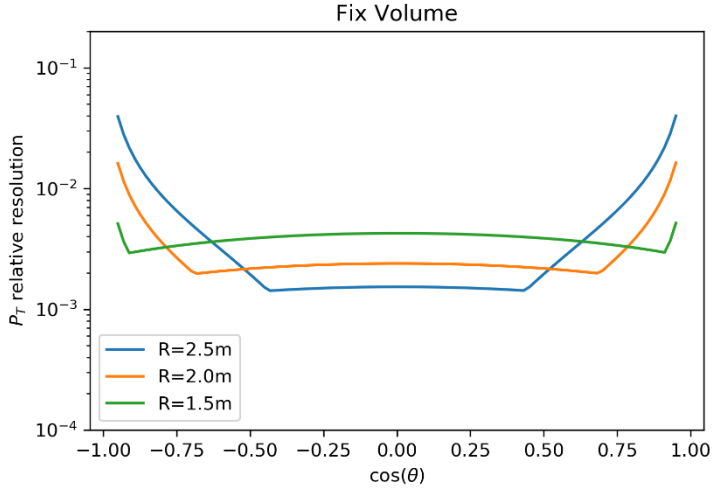


Fix Area or Volume

- We want to study the optimal R with fix cost
- We study similar problem
  - Optimal R with fix Area
  - Optimal R with fix Volume

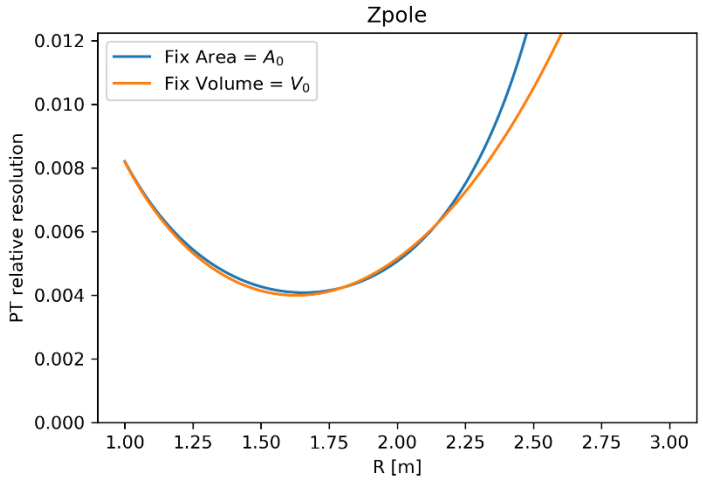




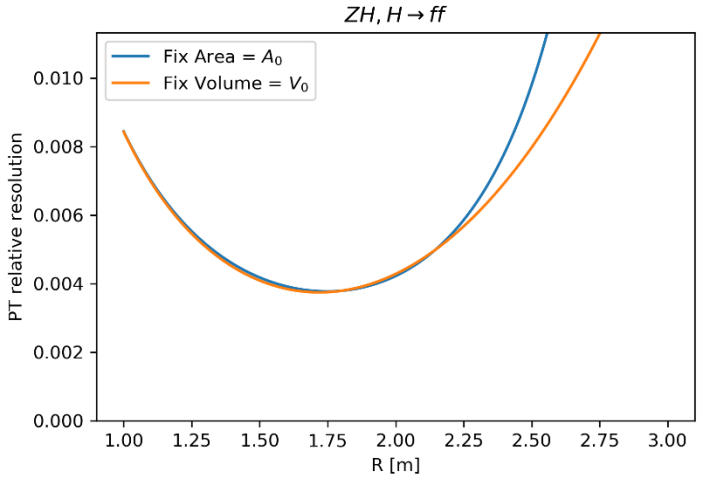


Optimize R

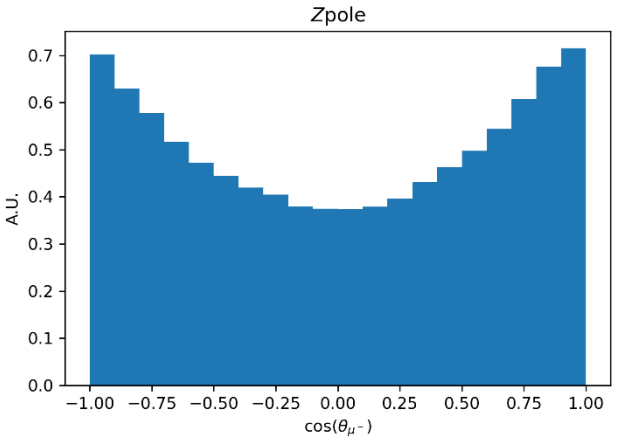
- Criteria
  - The average PT resolution of tracks (|cosθ|<0.99)
  - Weighted by the overall tracks polar-angle distribution
    - Zpole->2tracks
    - ZH,H->2tracks

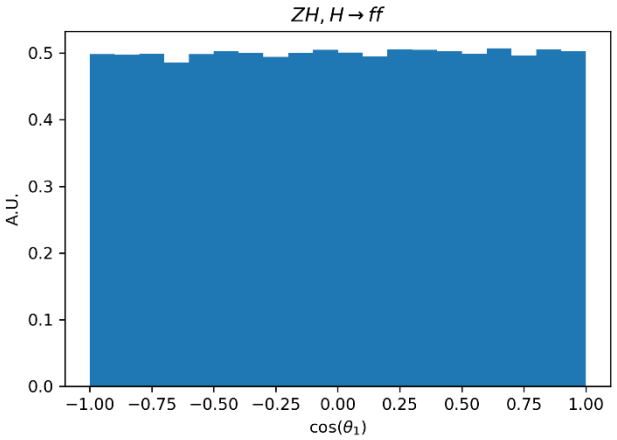


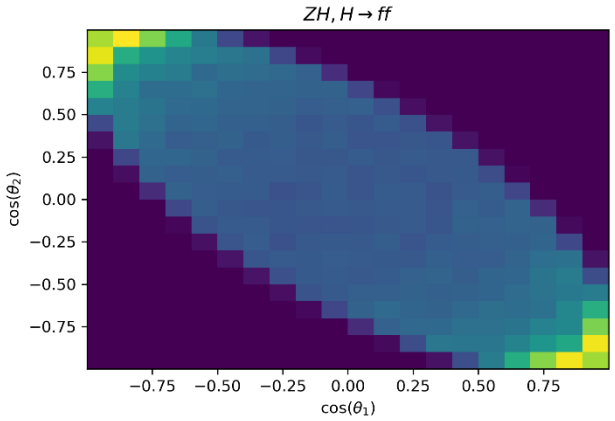
Optimal R for fix area 1.65m
Optimal R for fix volume 1.63m



Optimal R for fix area 1.75m
Optimal R for fix volume 1.73m







Optimize R

- The average of track momentum resolution depends on acceptance
- Due to the simplicity of our analysis, the optimal ratio of Z/R is independent to the desire cost