

PILE-UP study at IWCD

Subtask : The idea of smearing the vertex position for each track

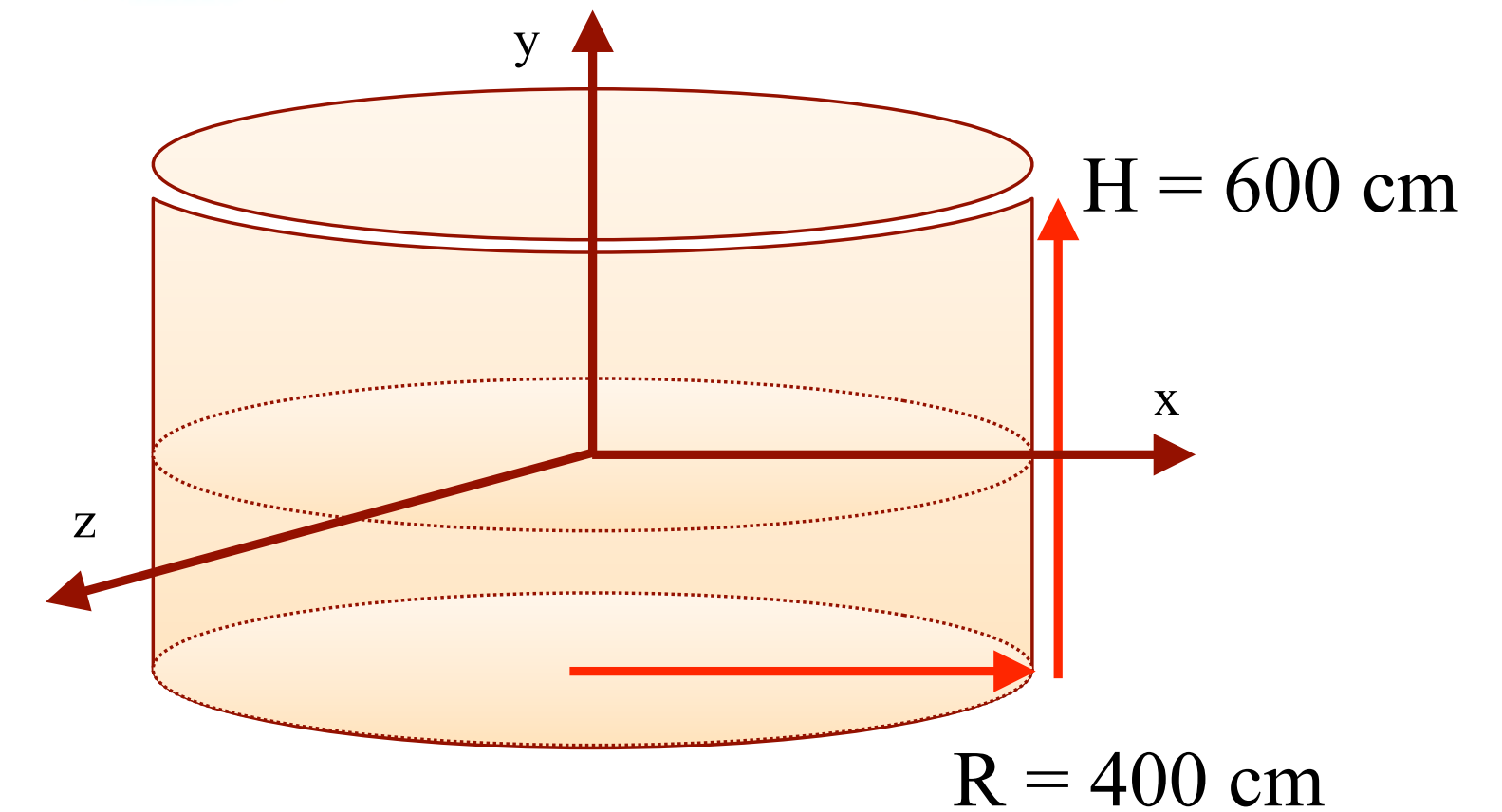


The idea of smearing the vertex position

- ASSUMPTION: in a previous task all the tracks have been reconstructed
- Here we always mean primary tracks and primary vertices
- $(x_V, y_V, z_V, t_V) = (x_{Tstart}, y_{Tstart}, z_{Tstart}, t_{Tstart})$
- Smearing performed with:

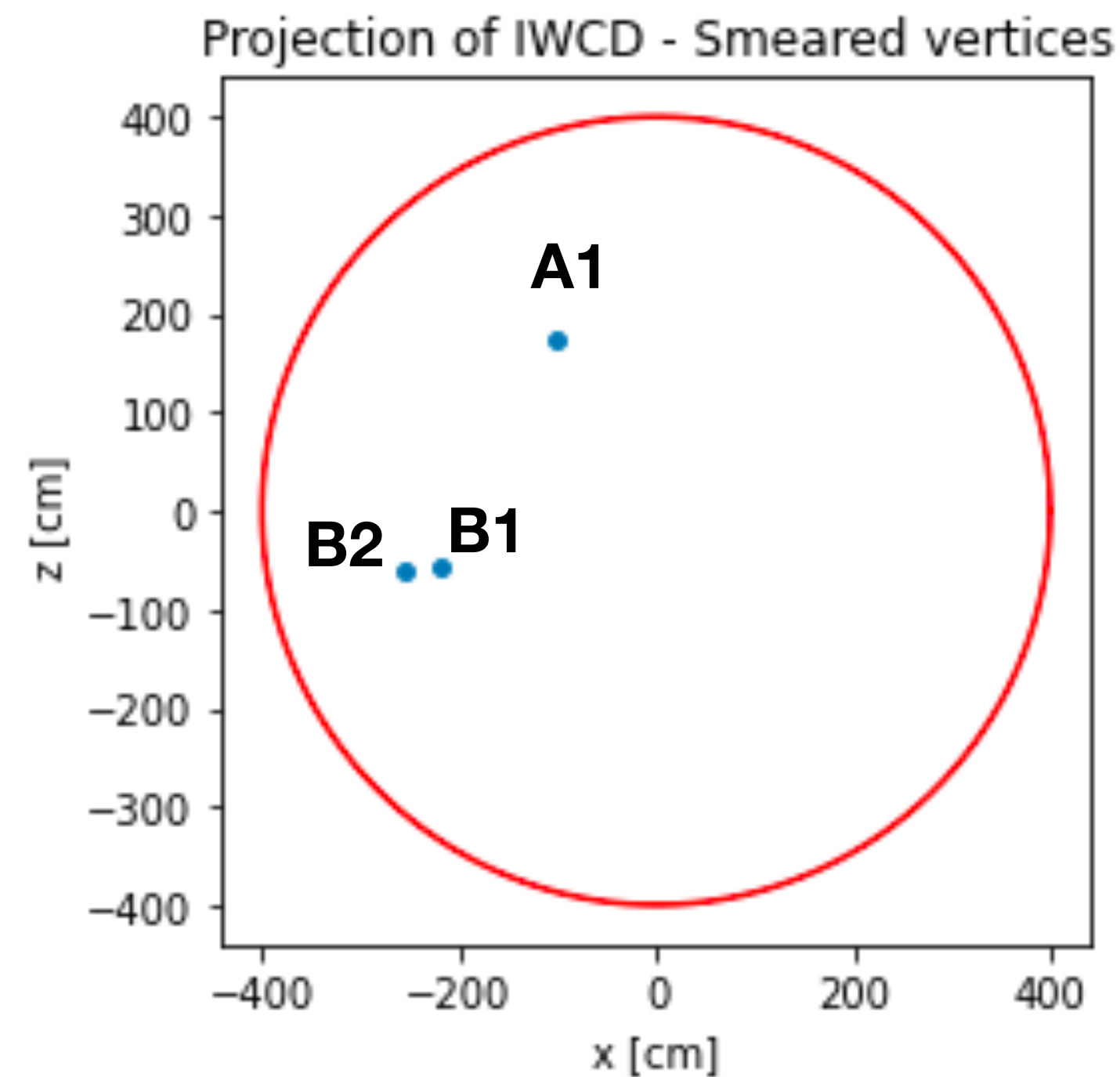
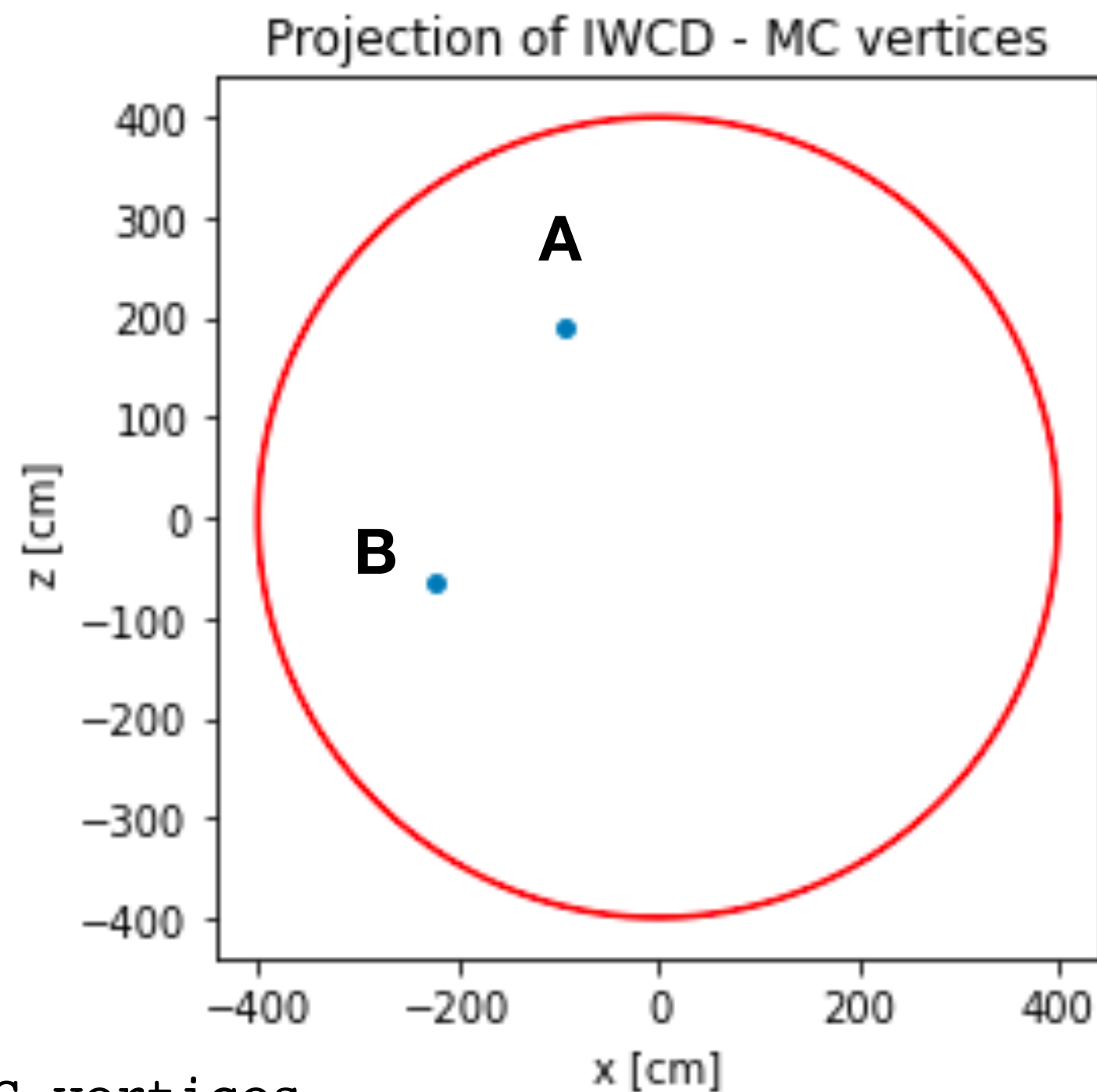
$$(x, y, z, t) + (Rnd(\mu, \sigma_x), Rnd(\mu, \sigma_y), Rnd(\mu, \sigma_z), Rnd(\mu, \sigma_t)) \quad \mu = 0, \sigma_x = \sigma_y = \sigma_z = 10 \text{ cm}, \sigma_t = 2 \text{ ns}$$

Random from a Gaussian distribution



The idea of smearing the vertex position

Plot MC and smeared vertices



MC vertices

A : $V(x,y,z,t) = (-91.76768 \ -131.1858 \ 189.30959 \ 211.73221)$

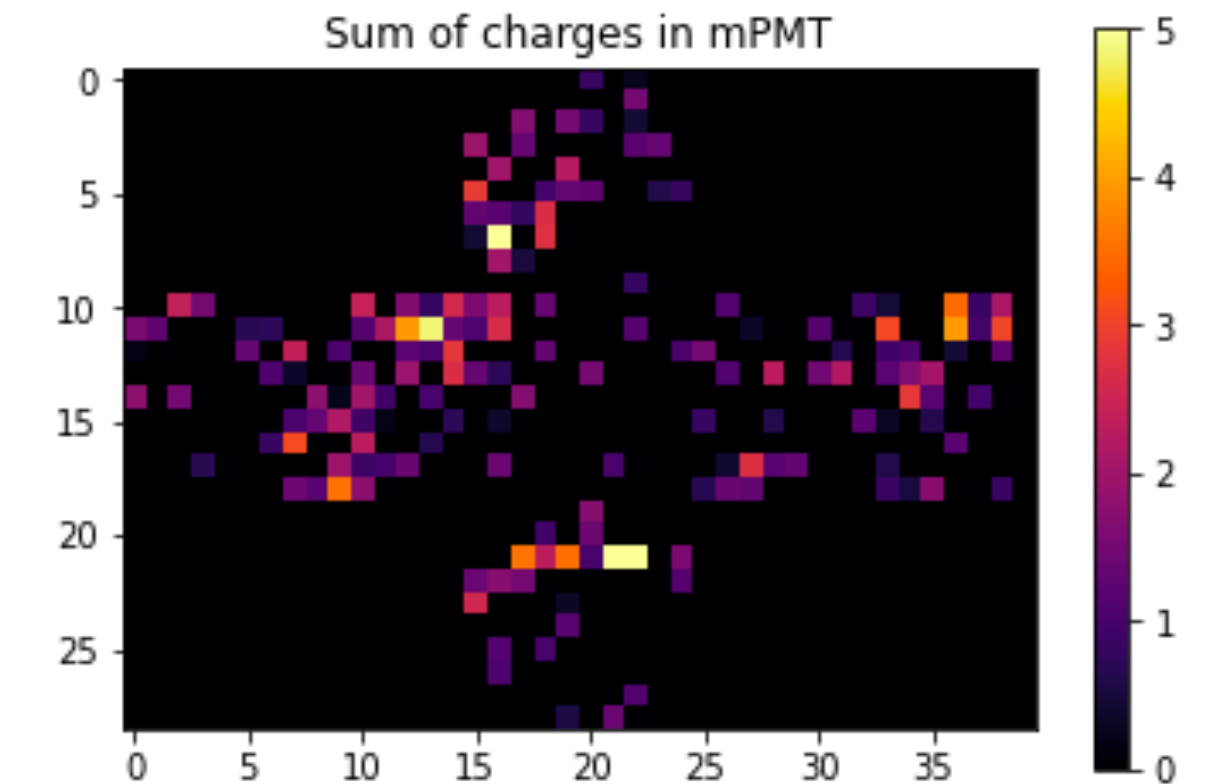
B : $V(x,y,z,t) = (-225.19762 \ -131.9646 \ -64.60702 \ 209.67133)$

smeared MC vertices

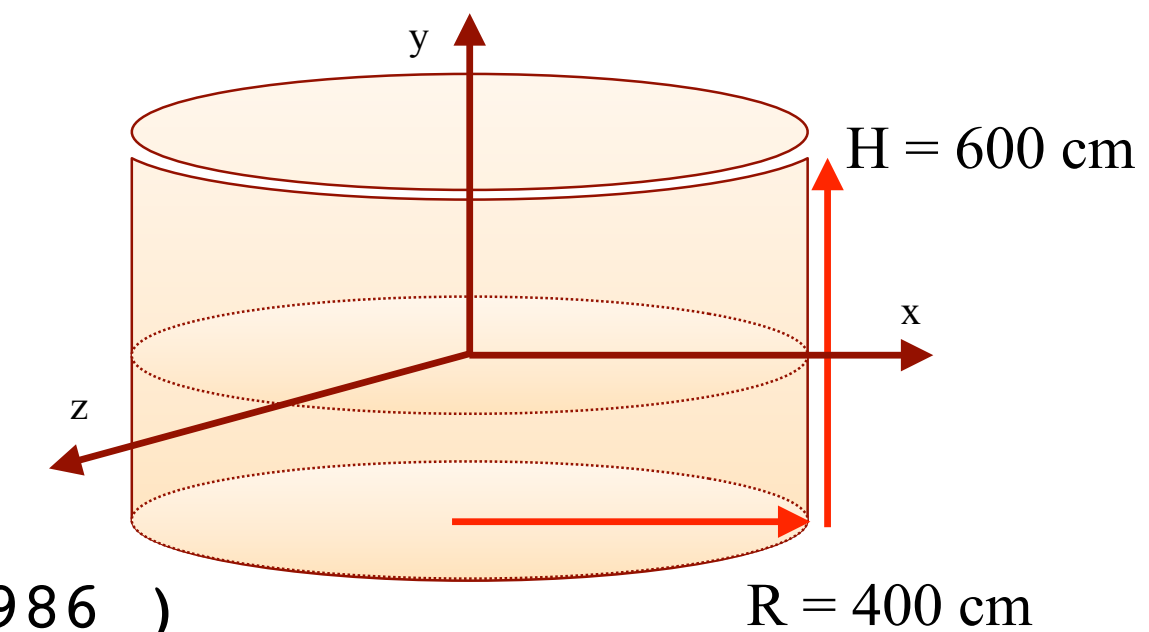
A1 : $V(x,y,z,t) = (-101.19425228079785 \ -107.60815129358994 \ 174.2169262857075 \ 208.95035642258986)$

B1 : $V(x,y,z,t) = (-256.02457884815396 \ -141.5640987968014 \ -60.98431475512573 \ 214.02148364760913)$

B2 : $V(x,y,z,t) = (-220.1091266236662 \ -141.48890096379455 \ -54.95912461045117 \ 211.4550855722959)$

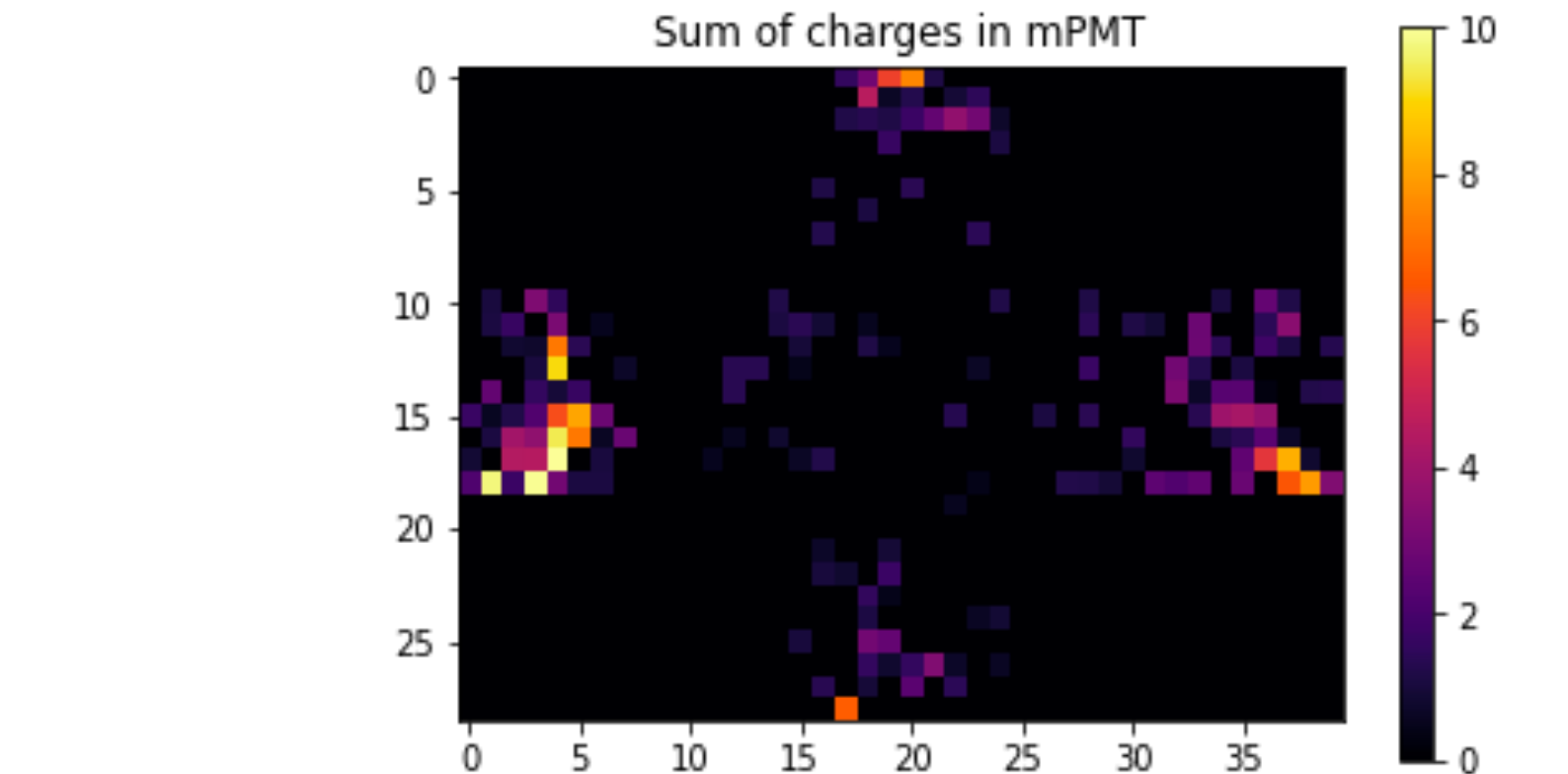
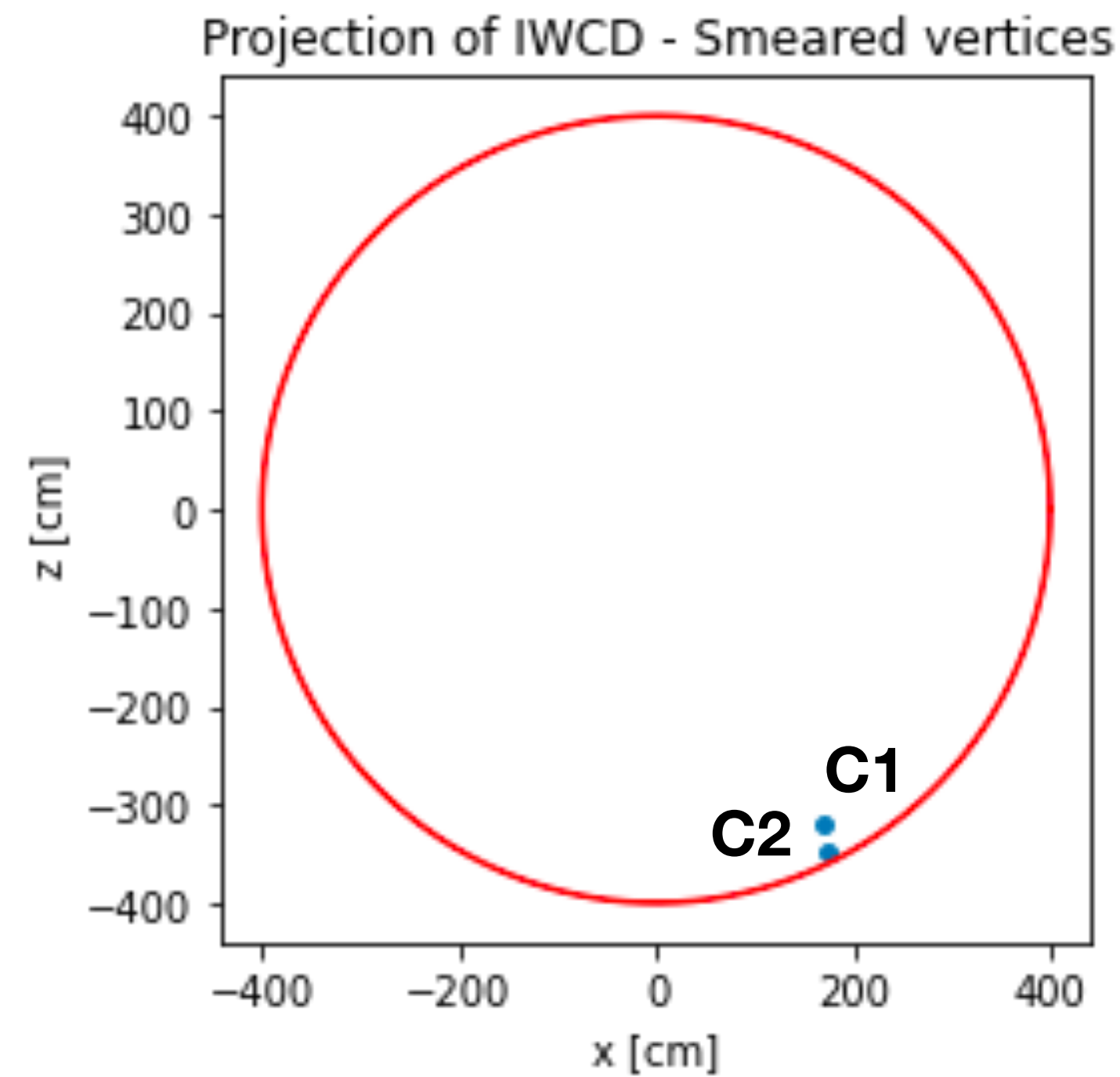
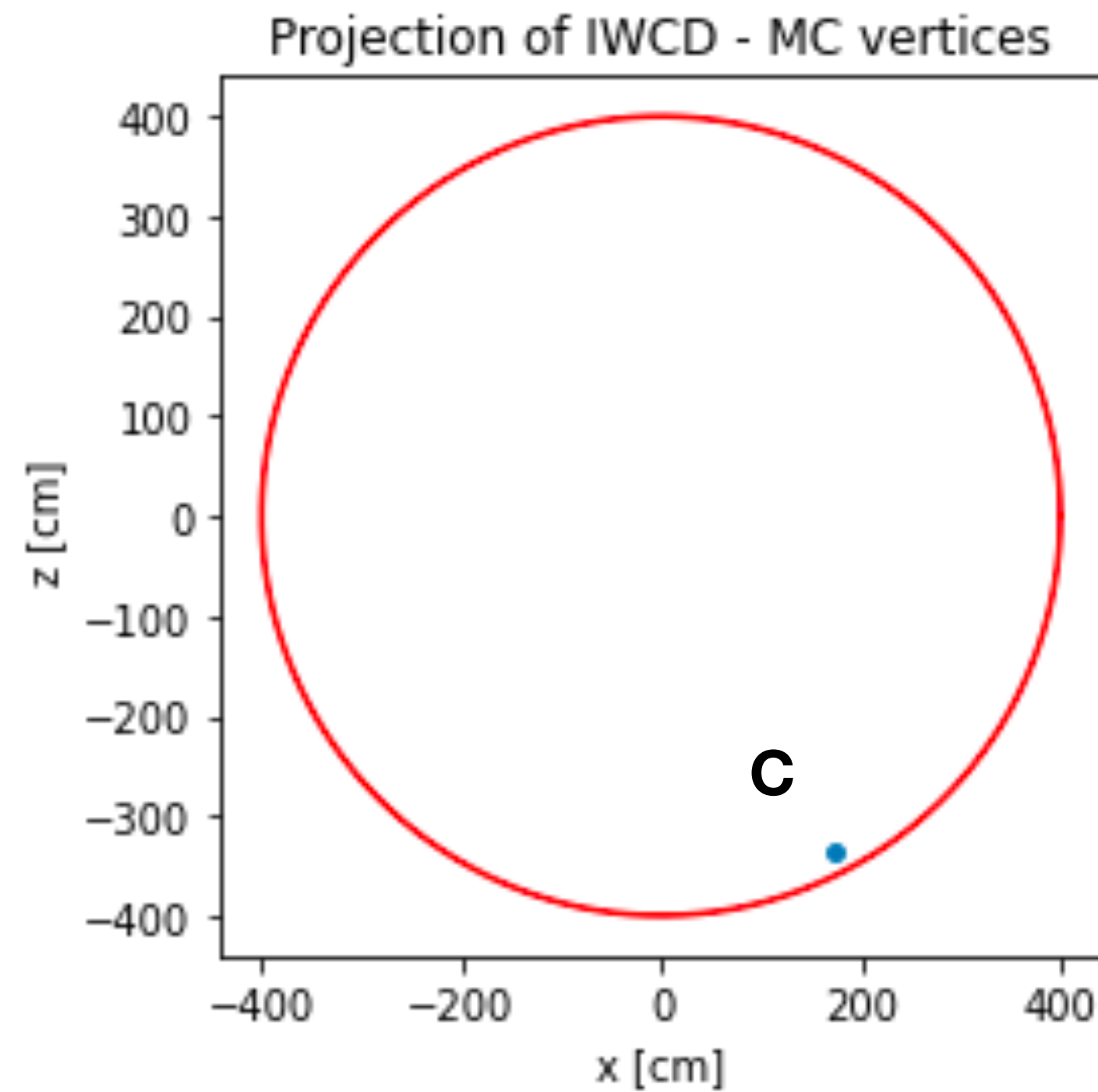


event_num = 303339 (Dataset: 3July500k.h5)
2 Vertices / 3 Tracks

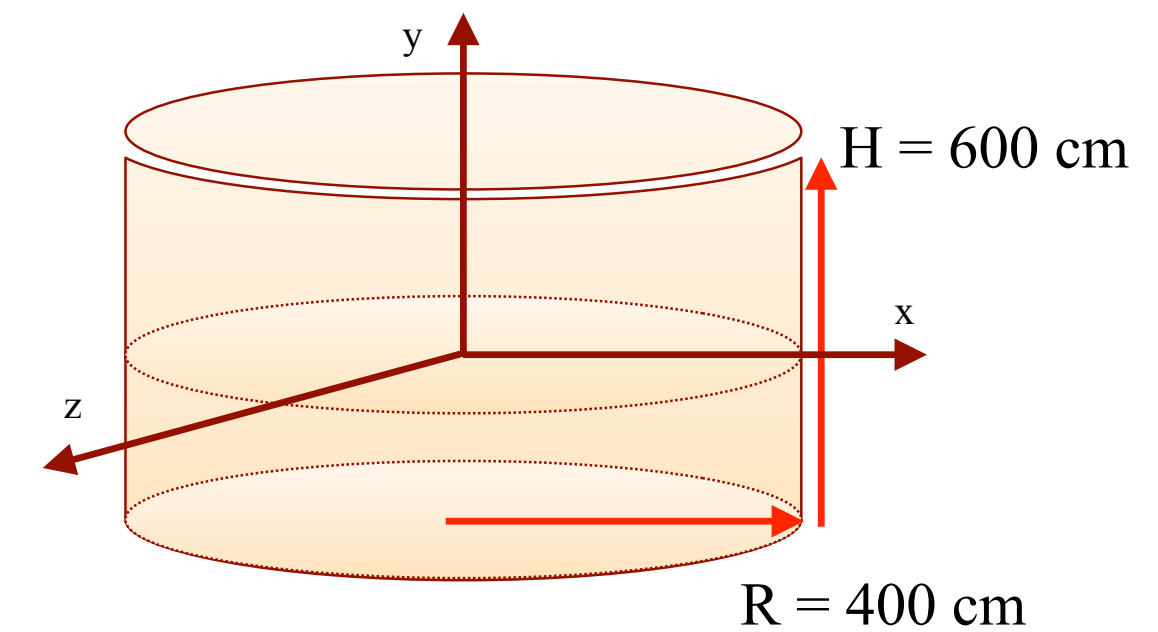


The idea of smearing the vertex position

Plot MC and smeared vertices



event_num = 30229 (Dataset: 3July500k.h5)
1 Vertex, 2 Tracks



MC vertices

C : $V(x,y,z,t) = (172.25089 \ 212.42703 \ -336.4018 \ 215.57181)$

smeared MC vertices

C1 : $V(x,y,z,t) = (168.05898415593455 \ 214.8399682720055 \ -319.4942119473541 \ 217.4103083204727)$

C2 : $V(x,y,z,t) = (173.287137380484 \ 218.96260002202817 \ -347.71082470278054 \ 215.19380884972142)$