IDS120h: PROTON P0-P14 TRAJECTORY FOOTPRINT AT z = -37.5, -10, 0, 50, 100, 200, 300, 400, 550 cm

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P0-P14 proton trajectory footprints for IDS120h at Z = -37.5, -10, 0, 50, 100, 200, 300, 400, 550 cm

- MARS1510/MCNP

- 10^{-11} MeV NEUTRON ENERGY CUTOFF

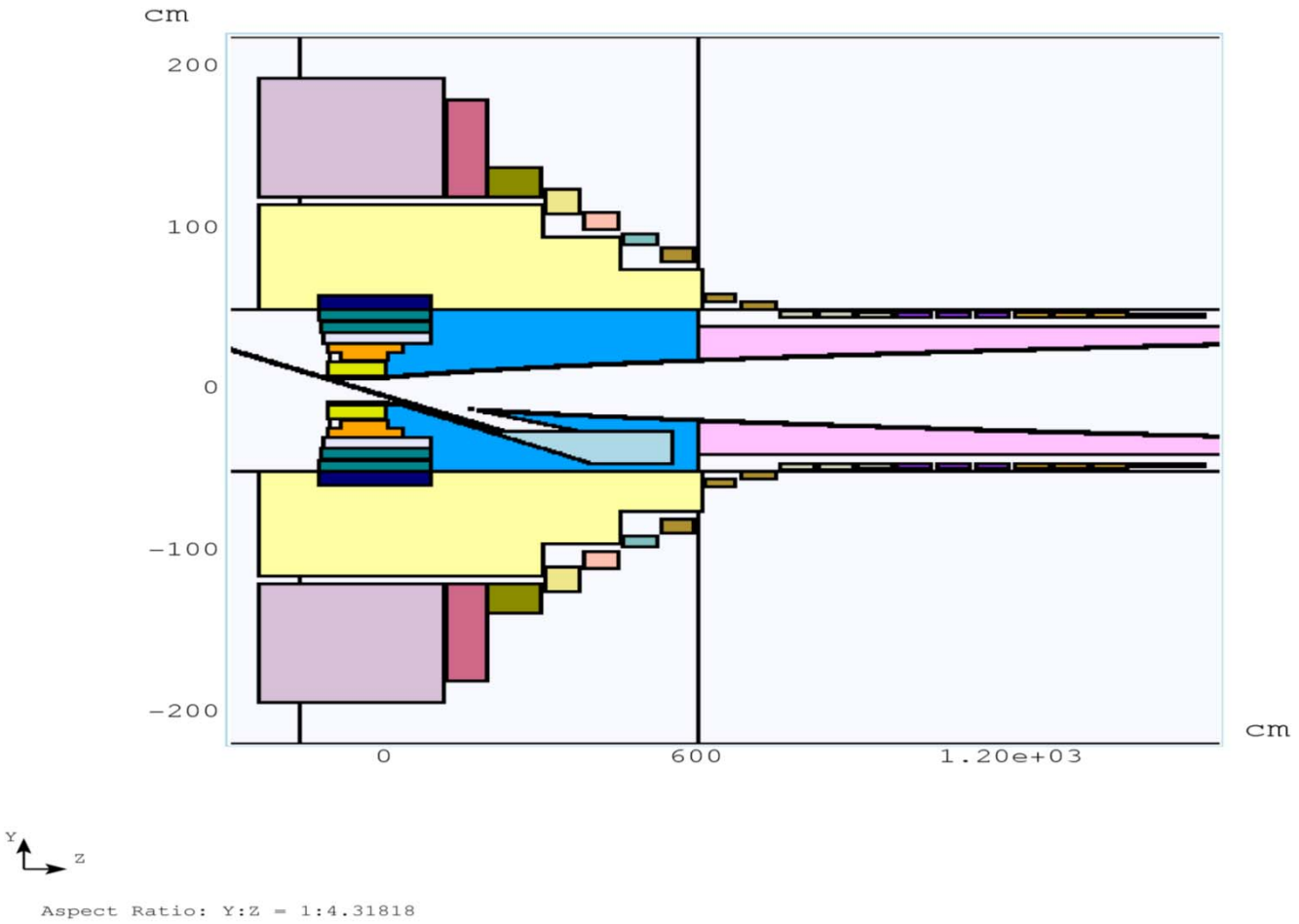
- SHIELDING: 60% WC + 40% H_2O

- 4 MW proton beam, Np = 100,000

- PROTONS ENERGY E = 8 GeV.

- GAUSSIAN PROFILE: $\sigma_x = \sigma_y = 0.12$ cm.

IDS120h geometry.



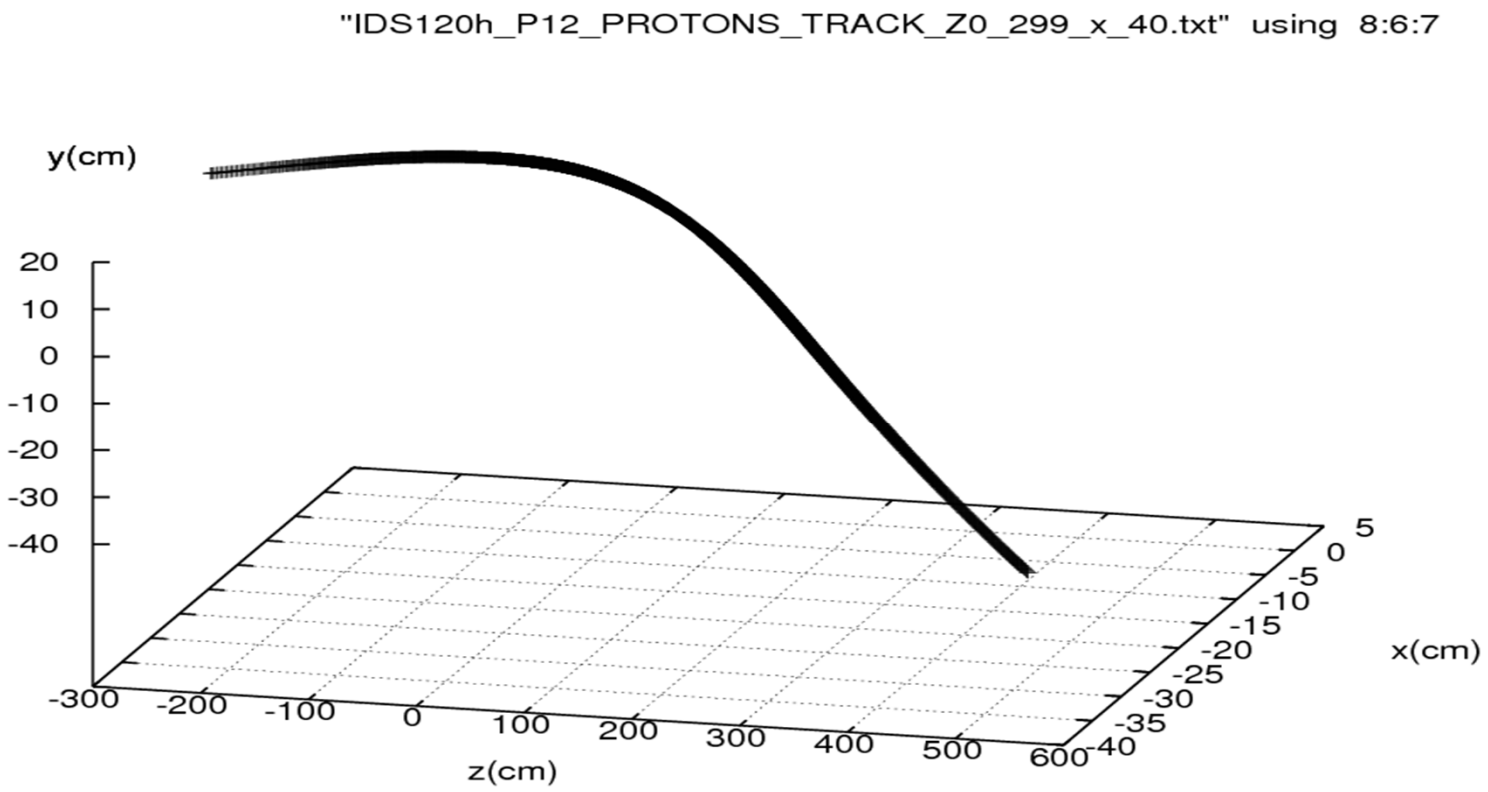
SC#1 NOW THE BIGGEST COIL, EXTENDED FURTHER UPSTREAM

RESISTIVE SOLENOID FURTHER AWAY FROM Hg POOL GAP, JET AND PROTON BEAM

IDS120h: PROTON 3D TRAJECTORY FROM Z = -300 cm

USING P12 OPTIMIZED INITIAL POINT WITH POOL WALLS AT x = +/-40 cm,
POOL GAP WALLS AT x = +/-6 cm FOR -15 <y < 0 cm AND AT x = +/-30 cm FOR -25 < y < -15 cm

INITIAL (x,y,z,cx,cy,cz) =(-19.7072, 17.9395, -300.0, 0.087459, 0.0446628, 0.995166)
FINAL (x,y,z,cx,cy,cz) = (-36.8303, -37.4611, 550.0, -0.077835, -0.028829, 0.996549)

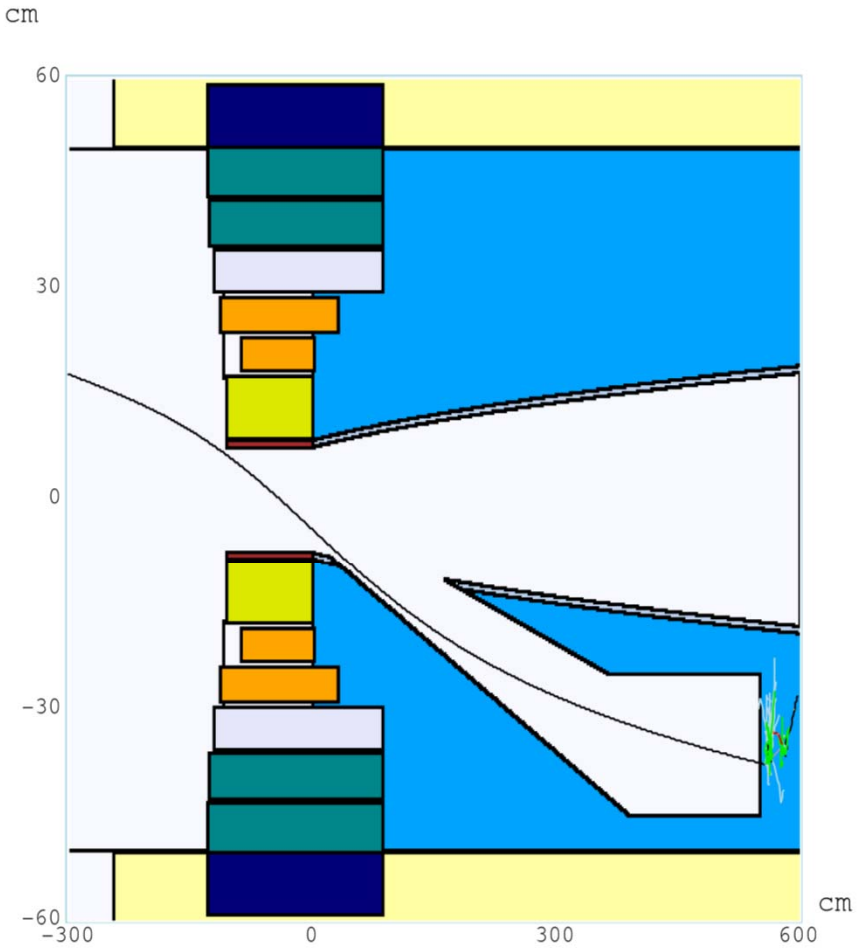


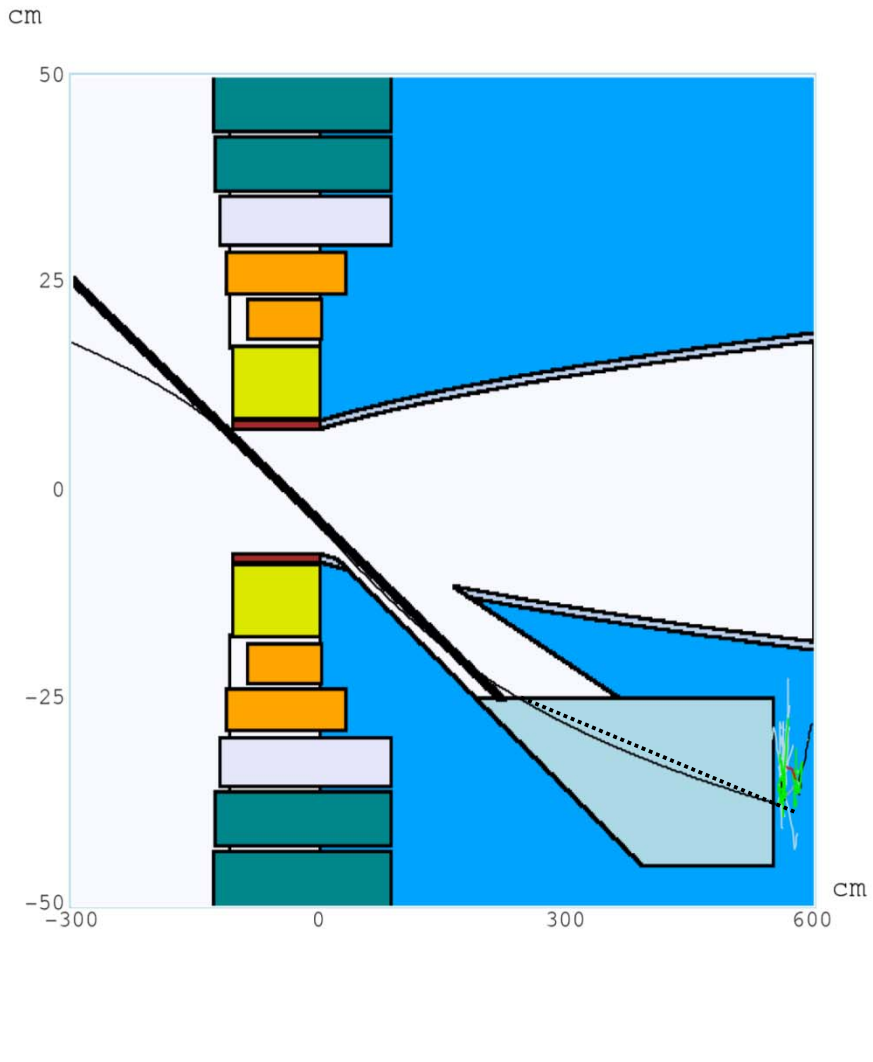
FOR POOL WALLS AT x = +/- 40 cm PROTONS STOPPED BY THE z = 550 cm POOL WALL

FOR POOL WALLS AT x = +/- 30 cm PROTONS STOPPED BY THE x= -30 cm POOL WALL

IDS120h: PROTONS TRAJECTORY FROM Z = -300 cm Y-Z PROJECTION

FREE Hg POOL SURFACE y = -25 cm





LENGTH OF STRAIGHT LINE: FOR x = +/-30 cm ~ 280 cm ~ 19 Int. Length
FOR x = +/-40 cm ~ 350 cm ~ 23 IL

FOR x=+/-40 cm POOL WALLS

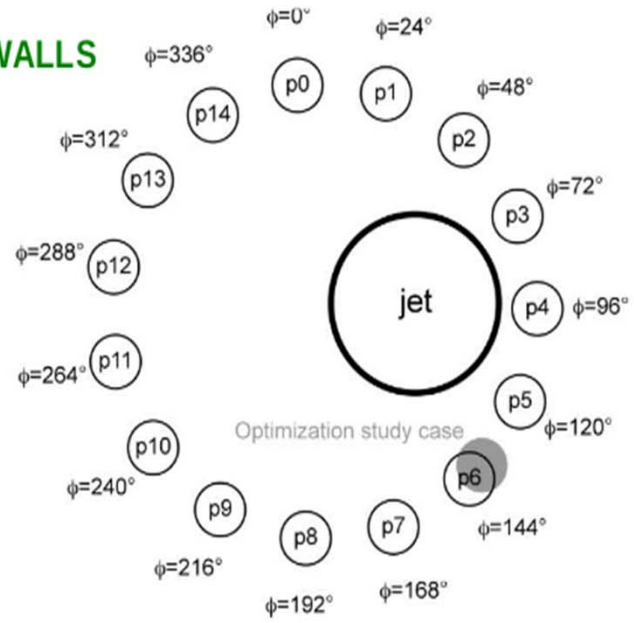


Figure 3: The layout of multiple proton beam entry directions relative to mercury jet at z=-75 cm.

POINTS P0, P13,P14 ARE STOPPED BY THE x=-40 cm WALL.
POINTS P10,P11,P12 ARE STOPPED BY THE z=550 cm WALL.
POINTS P1-P9 HIT THE z2 WALL WITH: z2=-10-15y, -45<y<-25, THIS IS THE INCLINED WALL TO THE RIGHT OF THE Hg POOL.

A change in the slope of the inclined right side of the pool does not improve the situation for P1-P9, protons will avoid that wall but they hit the x = -40 cm wall just after the end of the inclined one. P13 protons could reach z = 550 cm wall only if x = +/-45 cm. Overall for points P10, P11, P12, P13 will reach z = 550 cm for x = +/- 45 cm. SC#8 down the beam line is the first that will put limitations on the size of the pool along the x direction.

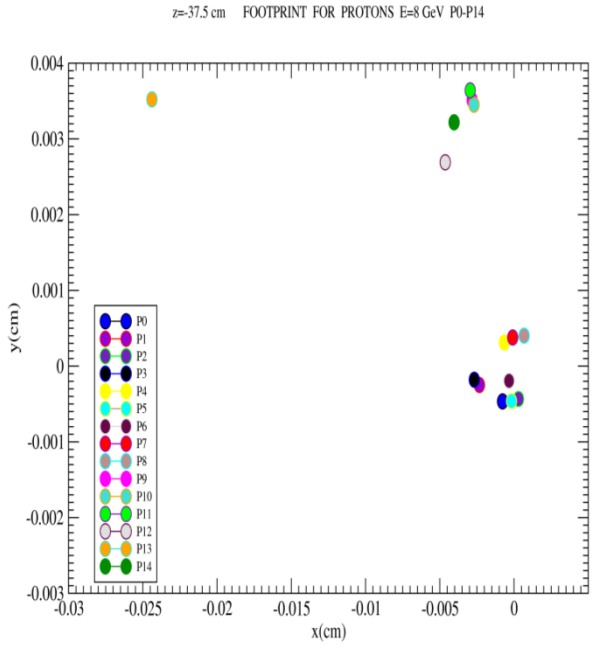
NOTICE

FOR Hg POOL SURFACE AT y = -25 cm THEN TO BE IN THE POOL
-a < x < +a, -45 < y < -25 cm, 190 < z < 550 cm.
LOWEST POINT OF Be WINDOW AT z = 600 IS ~ 7 cm ABOVE SURFACE LEVEL.
IF THE Hg POOL SURFACE IS AT y = -20 cm THEN TO BE IN THE POOL
-a < x < +a, -45 < y < -20 cm, 140 < z < 550 cm.
IF POOL SURFACE IS AT y = -20 cm THEN Be WINDOW SHOULD BE AT z ~ 249 cm
(assuming same margin between pool and Hg surface)

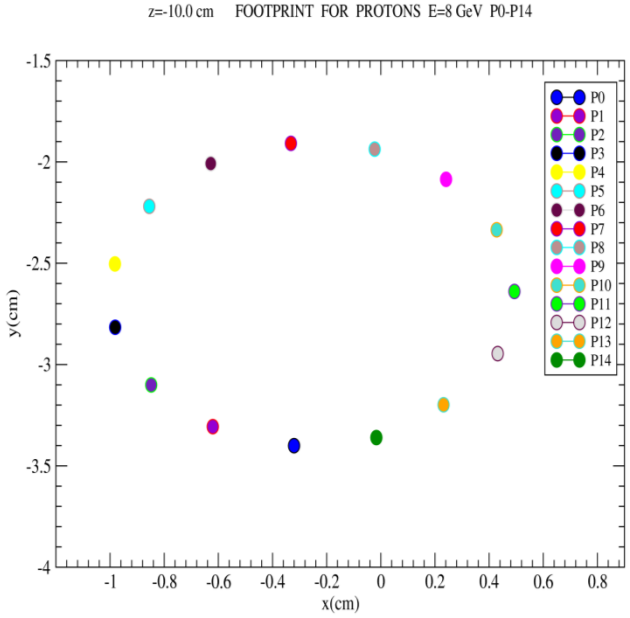
IDS120h :P0-P14 PROTON TRAJECTORY FOOTPRINTS AT z = -37.5, -10, 0, 50, 100, 200 cm

NOTICE:FOR Hg POOL SURFACE AT y = -25 cm z > 190 cm TO BE IN THE POOL.

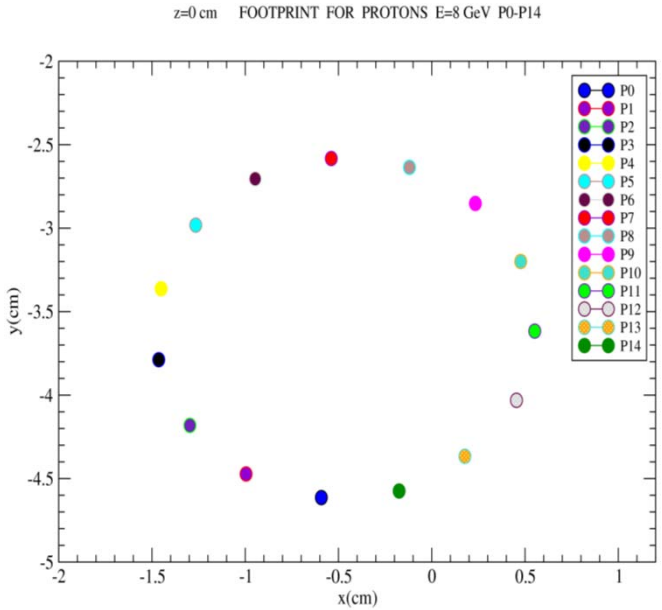
z = -37.5 cm



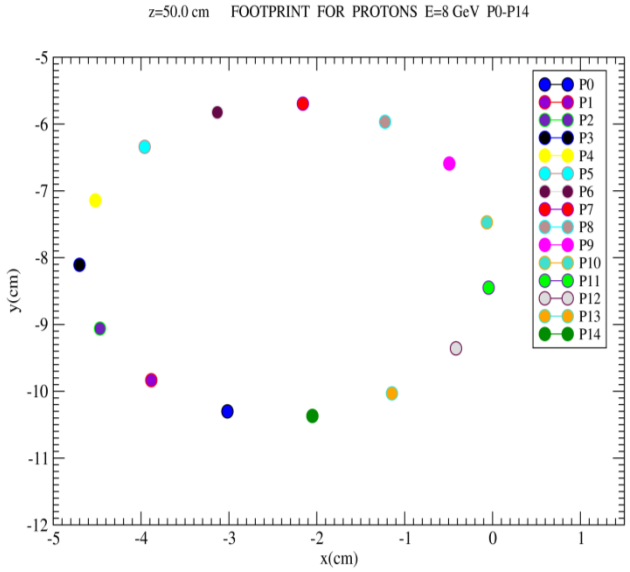
z = -10 cm



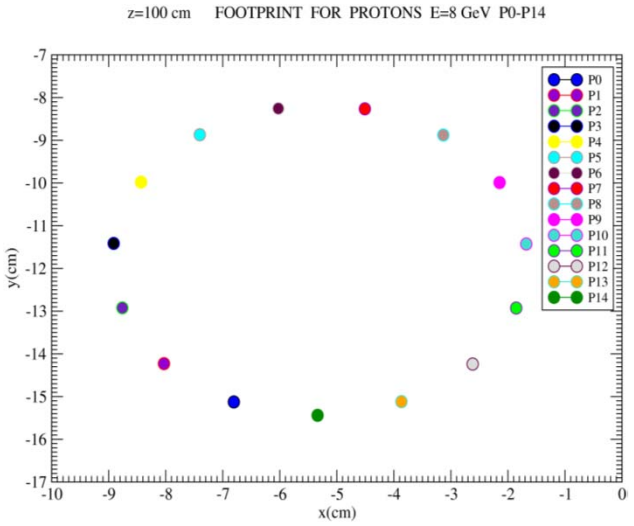
z = 0 cm



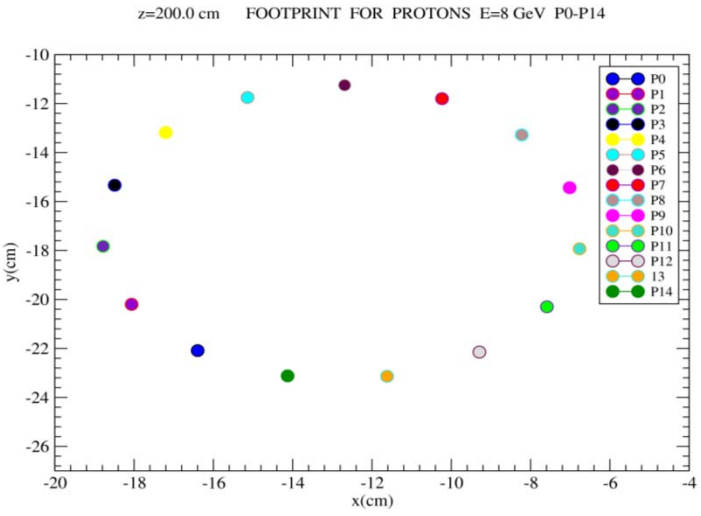
z = 50 cm



z = 100 cm

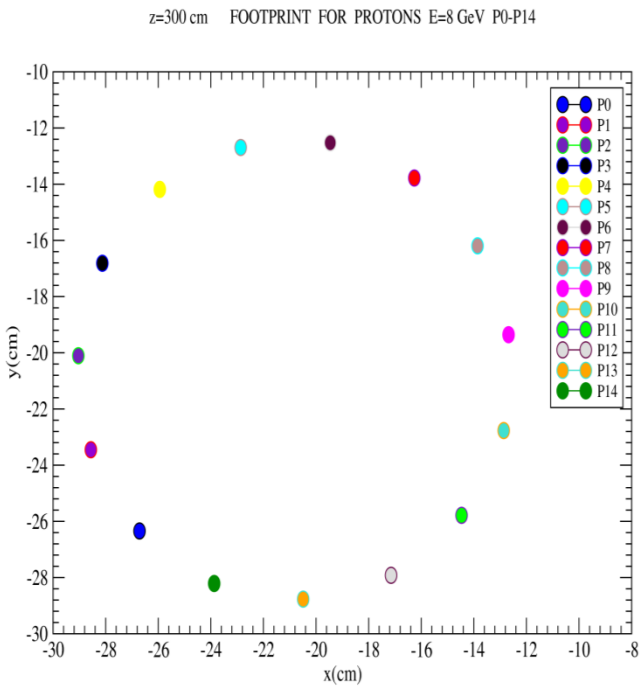


z = 200 cm

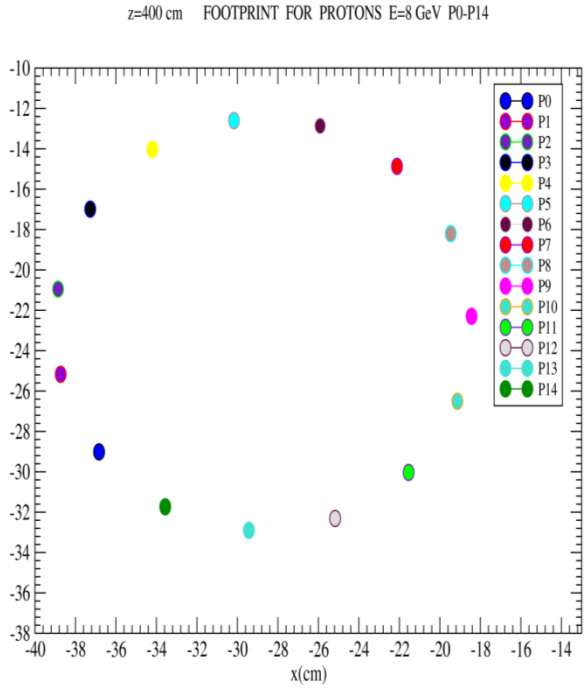


IDS120h: P0-P14 PROTON TRAJECTORY FOOTPRINTS AT z = 300, 400, 550 cm

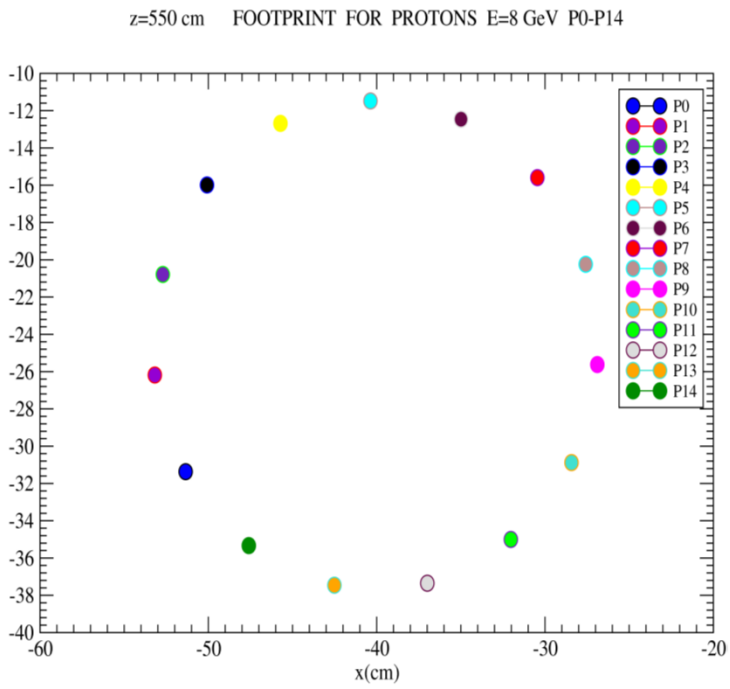
z = 300 cm



z = 400 cm



z = 550 cm



IDS120h: P12 POINT, PEAK OF TPD AND PDP *VS*. x FOR Hg JET, SLICE OF DX = 0.02 cm SHIFTED ALONG THE x AXIS IN STEPS OF 0.1 cm.