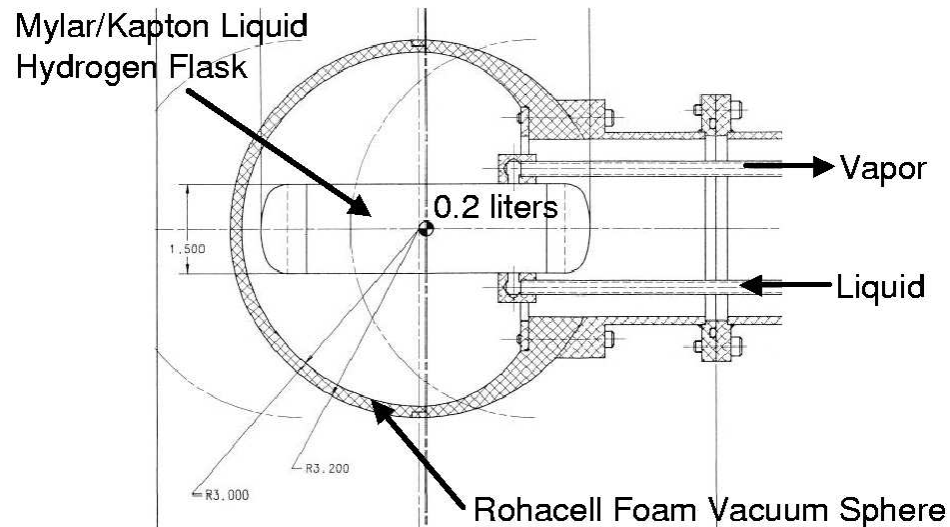
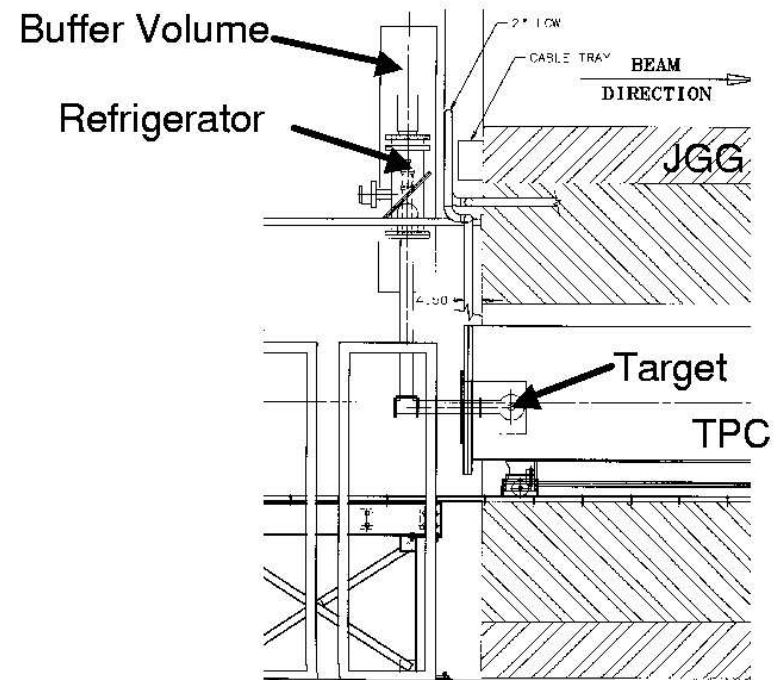


# LH2 target design

## Hydrogen Flask & Vacuum Sphere



## Hydrogen Target Layout



Hydrogen target is a cylinder 3.81 cm (1.50") in diameter and about 12 cm long. The distance from outer surface of Vacuum Sphere to the center of cylinder is 8.128 cm (3.2"). Position of LH2 shown in right drawing (marked as circle).

```
GTargetGeo& tgtGeo = GMIPPGeo::Instance().Target();  
zTgt = tgtGeo.CenterPos()[2];  
// 0: X-position, 1: Y-position, 2: Z-position
```

	X	Y	Z
<i>min</i>	-15.0	-16.55	-903.941
<i>max</i>	15.0	13.45	-825.201
<i>center</i>	0.0	-1.55	-864.571

Table 1: Software positions of the LH2 target.

where -825.201 cm is position of surface of sphere, -903.941 is upstream end of LH2 transfer line (Holger).

if -825.201 cm is true, then center of LH2:  $-825.201 - 8.128 = -833.3$  cm

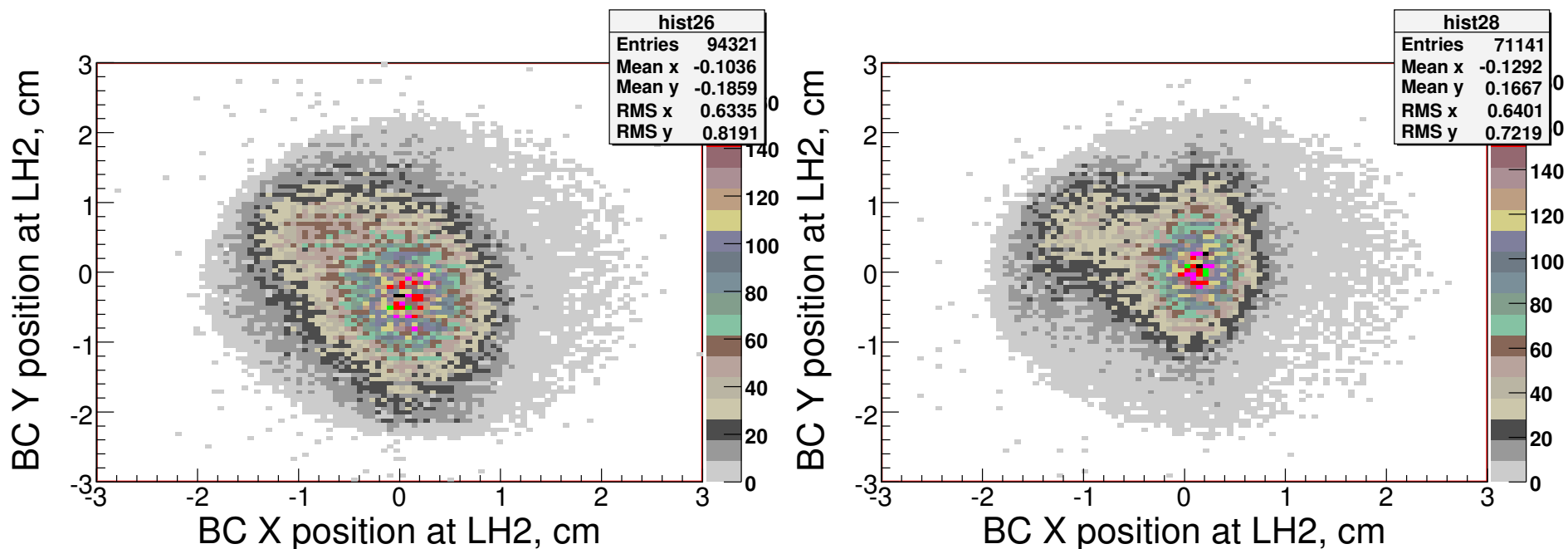
According to design:

$X_{max} - X_{min}$  should be 8.1 cm (but not 30 cm),

$Y_{max} - Y_{min}$  should be 8.1 cm (but not 30 cm),

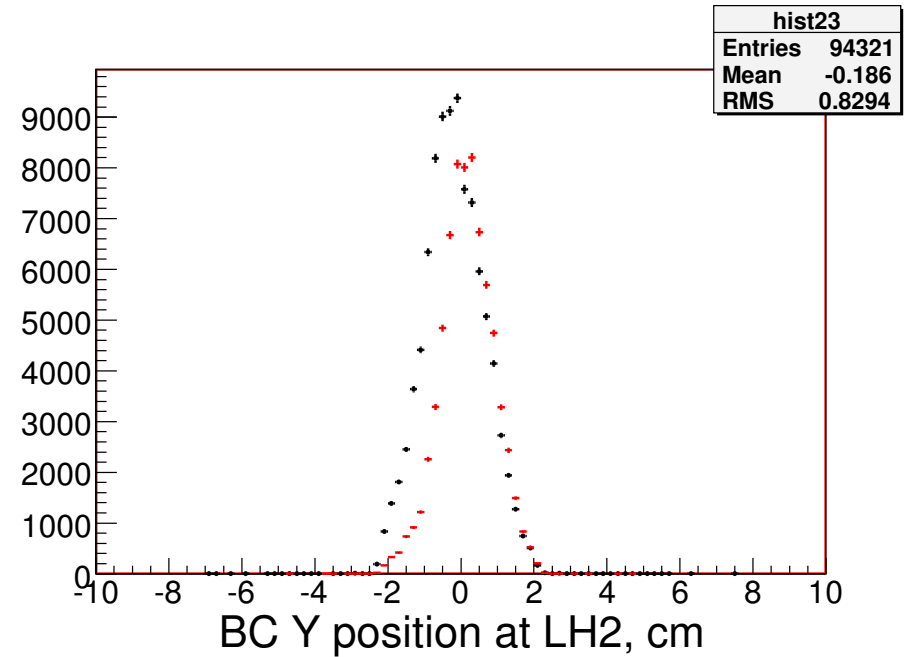
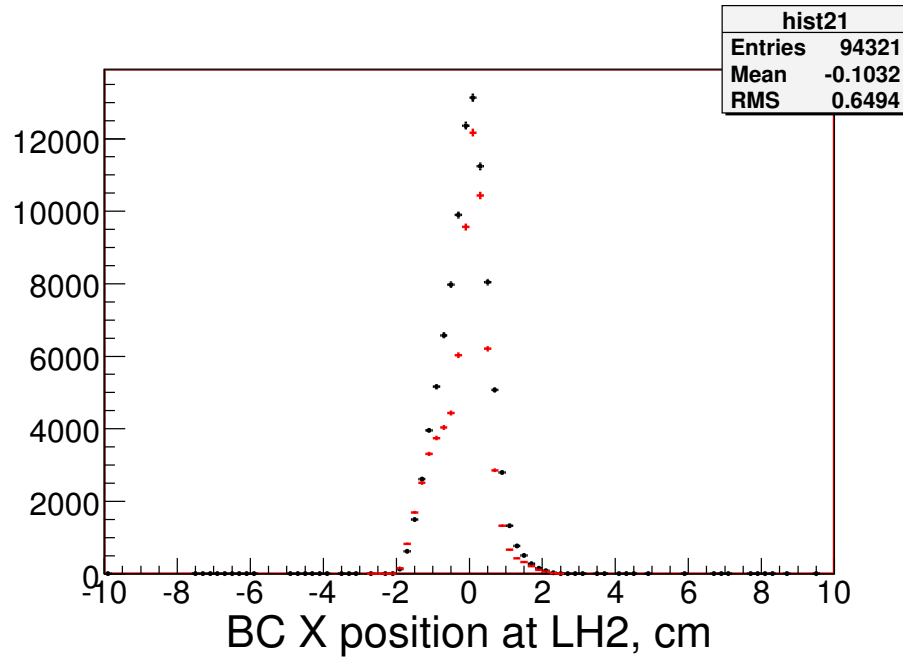
$Z_{max} - Z_{min}$  should be about 12 cm (but not 78 cm),

# how to find $X_0$ and $Y_0$ ?



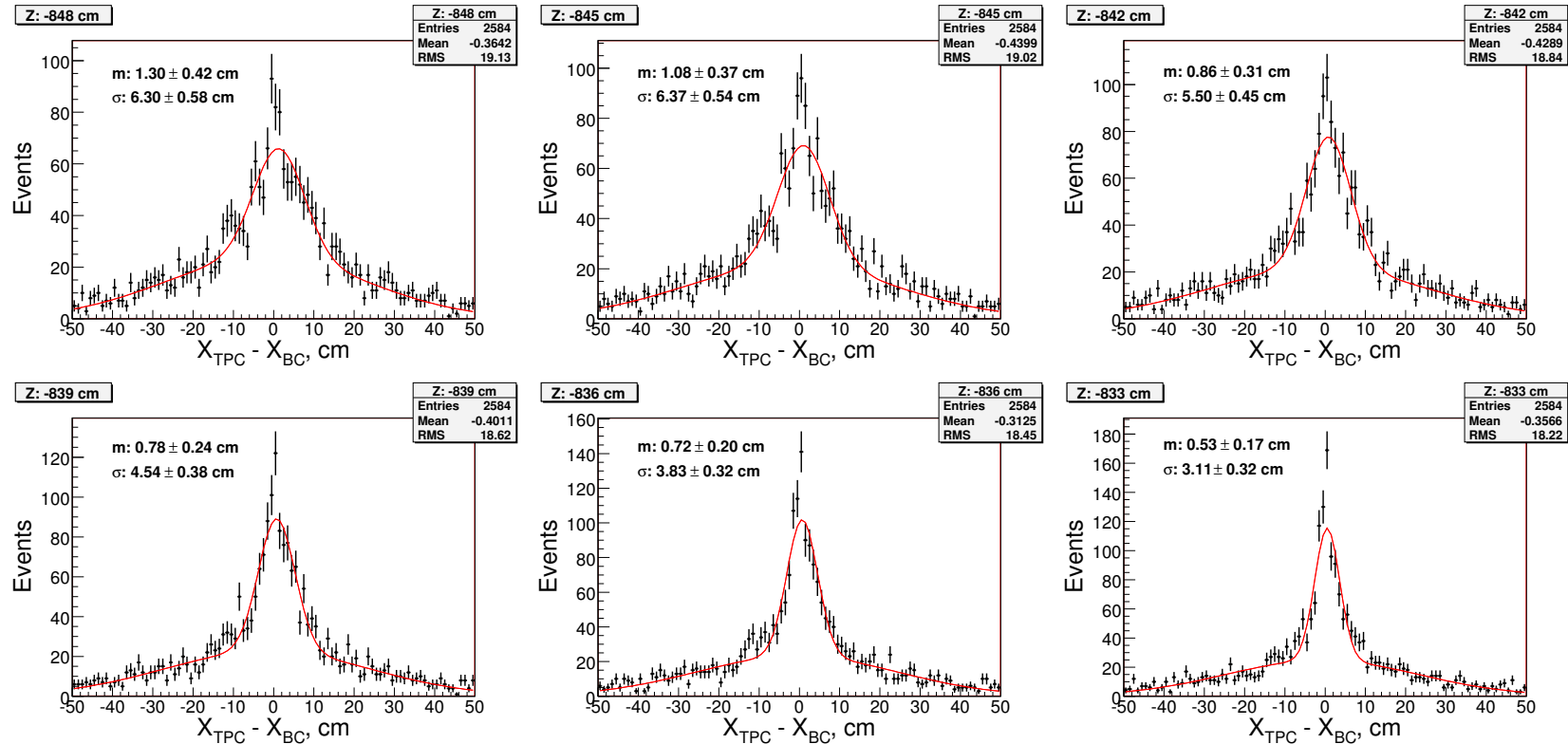
Projections of the beam tracks to Z-center of LH2 (-864 cm): left plot - without special requirements, right plot - same beam tracks, but requiring that on same event the TrkCand C1-6 tracks were reconstructed, calculated momentum should be equal to the central value of beam momentum, 59 and 84 GeV/c. Special requirements means that we try to select events without interactions or straight through.

# how to find $X_o$ and $Y_o$ ? cont



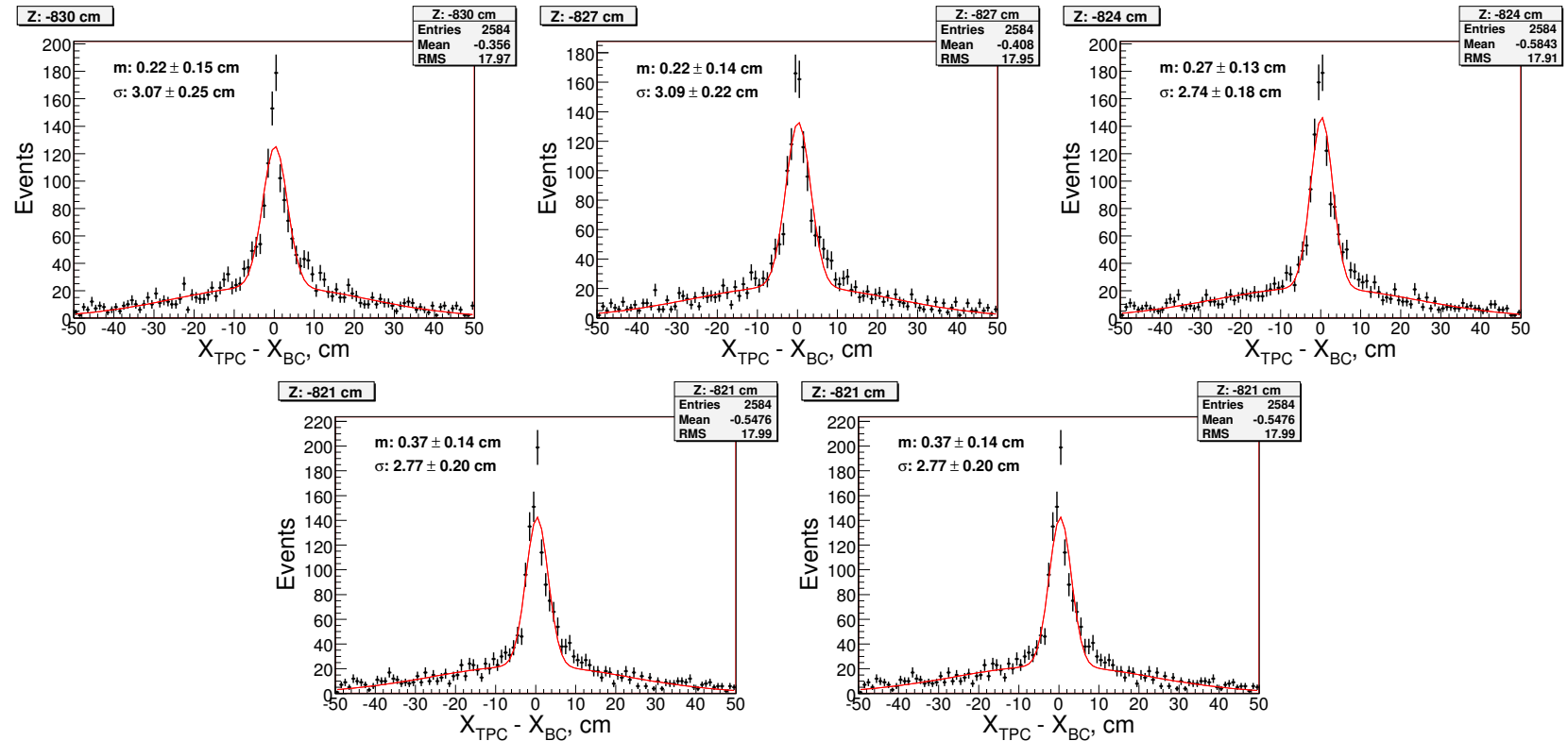
Projections of the beam tracks to Z-center of LH2 (-864 cm): left plot - in X-view, right - in Y-view. Black histograms - without special requirements, red histograms - same beam tracks, but selecting events without interactions or straight through. Red histograms suggests that  $X_o \approx 0$  cm and  $Y_o \approx 0$  cm, safe size to use  $R \approx 1$  cm.

# how to find $Z_0$ ?



$X_{TPC} - X_{BC}$  distributions for different  $Z_0$  of LH2. Track selection: TPC tracks within 0.5 up to 1.0 GeV/c - most sensitive to the  $Z_0$ . Plot with correct  $Z_0$  should be narrowest in width.

# how to find $Z_0$ ? cont



$X_{TPC} - X_{BC}$  distributions for different  $Z_0$  of LH2. Track selection: TPC tracks within 0.5 up to 1.0 GeV/c - most sensitive to the  $Z_0$ . Plot with correct  $Z_0$  should be narrowest in width.

# how to find $Z_o$ ? cont

$Z_o$ value, cm	width, cm
-848	$6.30 \pm 0.58$
-845	$6.37 \pm 0.54$
-842	$5.50 \pm 0.45$
-839	$4.54 \pm 0.38$
-836	$3.83 \pm 0.32$
-833	$3.11 \pm 0.32$
-830	$3.07 \pm 0.25$
-827	$3.09 \pm 0.22$
-824	$2.74 \pm 0.18$
-821	$2.77 \pm 0.20$
-818	$4.22 \pm 0.25$

Table 2: The width of distribution for different  $Z_o$  of the LH2 target. This study suggests that  $Z_o$  is around -824 cm