# Understanding the Beam Positions

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**Abstract**

Find the information on the beam overlap location per run sector in the ntuple or a database. It should be in the form of a 2-d transverse displacement vector (x,y) at CDF (0,0,0) and a 3-d direction vector (n_x,n_y,n_z) or equivalently two 3-d space points - the angle of the beam spot is important as well as the displacement. I will call the line defined by these two vectors the true beamline.

## 1 Beampipe geometry

The references for this is from CDF 5849 ,in which the first line in the Abstract is very important.An accurate description of the Bemapipe eomtry is very essentialfor CLC Luminosity measurementsas well as understanding Radiation Losses,Multiple Scattering.On Page 4 of this note it says that the position is (0.,0.,0.,) .This must be the CDF (0.,0.,0.).the Inner berylium pipe isthe one at (0.,0.,0.).

## 2 Beam Position in Run II

The position of the beam line is an important input for my analysis.A lot os algorithms are used to find the beam position.CDF note 6327 talks about the COT/SVX Beamline andhowthe Beam ostion can becalcualted using the tracks found with COT or SVX.These two measurements allow to check the global alignment of the two tracking systems and and there are different tables int he database for different measurements. The beam positions are calcualted and stored in a run by run basis.HistoryCode is to understand the reconstruction passes used to get the beam positions for a run.

Two algorithms are used ,same as ones in RUN I.The first algorithm is based on the reconstruction of the primary vertex for each event using the tracks.This is the default algorithm for fitting the beamline.The second is based directly on the tracks.Using the correlation of the $d_0$ and $\phi_0$ parameter of the track.The results of this algorithm are stored in database as wellfor crosscheck the default beamline.

From the CDF Vertex and Beamline groupwebsite.`http://www-cdf.fnal.gov/internal/upgrades/align/beam.html`

Since I will be working with Tracks that have more Si hits than COT, my choice of beamline would be SVX Beamline.For more information on the Tracking Algorithm 11 tracks ,look at TrackAlgorithm Note .

## 3 Beamline Varibles available in Ntuple

The Beamline information for Stntuples is stored in TStnBeamPosBlock,with Class TStnBeamPo is used to derive the Coordinates – $X_0, Y_0$