Track phi convention.

Flemming Videbæk December 23, 2004

This note is mainly to inform of the different angle convention that pieces of BRAHMS software uses in regard to FS.

1) The official coordinate system has Z along the beam axis pointing 'north' along the FS. Y point towards the heavens and X toward the MRS spectrometer. This is what is used by BRAG (GEANT) and thus for FS it implies that for track

 $\begin{array}{l} y \!\!> \! 0 \rightarrow \! \phi \text{ is in range } \sim \!\! 170\text{-}180 \\ y \!\!< \! 0 \rightarrow \! \phi \text{ is in range } \sim \! 180\text{-}190 \end{array}$

The precise range depends on the spectrometer setting . An estimate of the range is $\Delta \varphi = 2A \tan(4/(450 * \sin(\theta)))$,

2) The tracking code calculates phi, theta from the vector connecting the vertex and the entrance to D1, but has implemented this using atan.. rather than atan2 and thus resulting

y>0 -> φ phi in range of -10-0 (negative) y<0 -> φ phi ~ -10-0 thus φ (reco) + $\pi = \varphi$ (geant)

3) The acceptance code uses yet another convention

 $\phi \in [-90,90]$ but y> 0 $\phi > 0$ y < 0 $\phi < 0$

In general as long as we look at single (semi-inclusive) spectra and average over symmetric acceptances in the tracking i.e. no y-dependence this is not a problem. In case of correlation studies (HBT, v2) this IS an issue that has to be dealt with properly.

On a final note for completeness the polar angle θ is positive for both FS and MRS.