

Contribution into H1(DESY) Detector Data Analysis

V.V. Palichik

Laboratory of Information Technologies, JINR

M.N. Kapishin

Laboratory of Particle Physics, JINR

One of the main interests of the H1 collaboration at DESY(Hamburg) is to measure the structure functions of proton. The Dubna group is fully responsible for the Backward Proportional Chamber (BPC) of the H1 detector.

The BPC alignment (x,y,z-shifts and PHI-rotation) has been accomplished to its nearest detectors: the Central Jet Chamber (CJC) and Spaghetti Calorimeter using the experimental data collected in 2006-07 years. After the BPC alignment the dX,dY-residuals between the detectors improved to the values of less than 1 mm in comparison with the residuals of 1-2 cm before the alignment (see Fig.1).

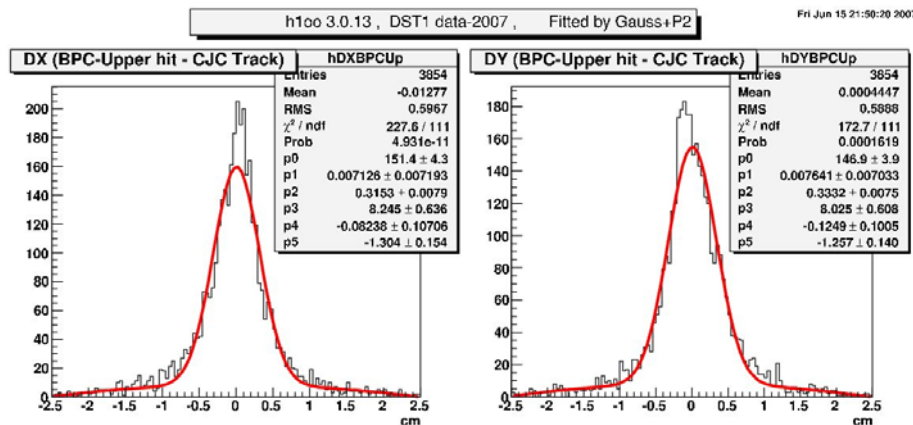


Fig. 1: Distribution of XY-residuals (fitted by Gaussian and parabola, the p1 parameter is a mean value of dX, dY, i.e. maximum of Gaussian function) between the upper BPC part and CJC X,Y-projections (cm) on the BPC Z-plane after BPC alignment to CJC on 2007 data. The same results are obtained for the lower BPC part and on 2006 data

A good result has been also obtained for the residuals in the polar angle θ (< 0.2 mrad). Looking at the $d\theta$ (BPC-CJC)-residuals calculated for different azimuth angles ϕ with the intervals of 20 degrees, we can observe the spread of ± 1 mrad (see Fig.2).

However, for accurate measurements it is desirable to decrease the spread of the residuals $d\theta$ vs ϕ . For this purpose an additional tuning of the BPC position was done. By fitting the $d\theta$ vs ϕ distribution with $P_0 + P_1 * \sin(\phi + P_2)$ function for the upper and lower BPC parts separately, the final corrections are obtained which are less than 1 mm for X and Y coordinates. After this position tuning the maximal deviations of the $d\theta$ (BPC-CJC) vs ϕ became less than 0.5 mrad (see Fig.3).

As a result a 2-step procedure for the BPC alignment is proposed. The procedure allows to use this detector for more accurate calculation of the scattering angle of electrons and positrons that is necessary for the measurement of the proton longitudinal structure function.

The results have been reported at the H1 Data Quality meeting for Low Proton Energy Run on 25.VI.07 and are already included into the H1 Data Base.

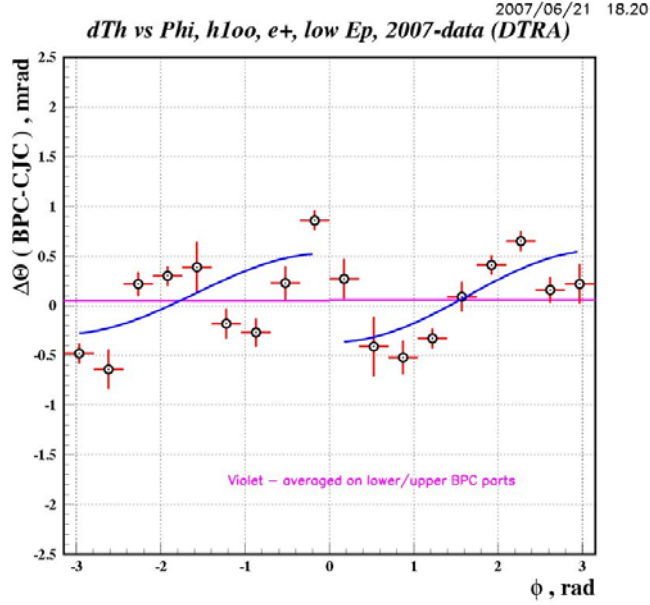


Fig. 2: Mean values of Gaussian for polar angle $d\theta(\text{BPC-CJC})$ residuals in 20 degrees ϕ angle intervals on 2007 data. Solid lines is a fit by $P_0 + P_1 \sin(\phi + P_2)$ for lower ($\phi < 0$) and upper ($\phi > 0$) BPC parts separately

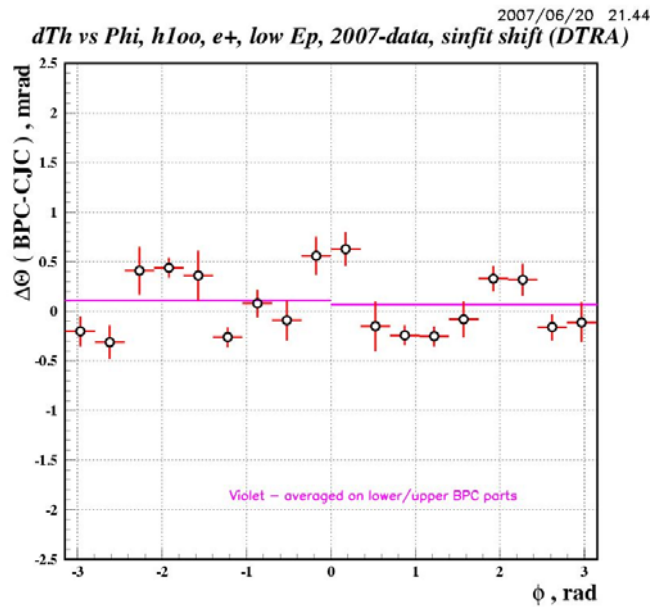


Fig. 3: Mean values of Gaussian for polar angle $d\theta(\text{BPC-CJC})$ residuals in 20 degrees ϕ angle intervals on 2007 data after BPC XY-positions tuning