Estimation of pion asymmetry contribution.

The main cut which used in analysis to reject pions based on PreShower (E_{PS}>500). However some part of pions remains after that cut and therefore make contribution to measured asymmetry. Following analysis was dome to make an estimation of such contribution.

We calculated two asymmetries for two sets of data: $A_>$ for our usual data set with E_{PS}>500 cut and $A_<$ for data set with opposite cut E_{PS}<500. These two asymmetries can be written in following form:

$$A^> = P_e^> A_e + P_\pi^> A_\pi$$
$$A^< = P_e^< A_e + P_\pi^< A_\pi$$

(1)

where $P_e^>$ and $P_\pi^>$ are parrt of electrons and pions in data-set with E_{PS}>500, and $P_e^<$ and $P_\pi^<$ are the same values for data-set with E_{PS}<500. Solving equation (1) for A_e and A_π one can get following equations:

$$A_e = \frac{A^> P_\pi^< - A^< P_\pi^>}{P_e^> P_\pi^< - P_e^< P_\pi^>}$$

$$A_\pi = \frac{A^< P_e^> - A^> P_e^<}{P_e^> P_\pi^< - P_e^< P_\pi^>}$$

(2)

Results for calculation of $A_>$ and $A_<$ asymmetries presented in table 1.

	Kin 4		Kin 3	
	<	>	<	>
A	-0.064	-0.055	-0.044	-0.040
N	2909	104046	383	14301

Table 1: Asymmetry for 2 data-sets

To estimate $P_e^>$, $P_\pi^>$, $P_e^<$ and $P_\pi^<$ we fit PS distribution for neutral quasielastic events (fig 1). This fit was made using fit of PS distribution for positive particles (choosed by deflection in BigBite, fig 2). Because most part of positive particles in BigBite are pions and assuming that PS distribution for positive and negative pions has the same form, one can use fit-function for positive pions to fit negative pions distribution in quasielastic spectrum. For electrons fit we used a Gaussian distribution obtained by fiting PS distribution for elastic events.

Results for $P_e^>$, $P_\pi^>$, $P_e^<$ and $P_\pi^<$, obtained from figure 1, presented in table 2.

	Kin 4		Kin 3	
	<	>	<	>
P_e	0.24	0.76	0.36	0.98
P_π	0.95	0.05	0.64	0.02

Table 2: Pion and electrons portion in PS distribution

Using numbers from tables 1 and 2, and equations (2), we get asymmetries for electrons and pions. Results for kin 3 and kin 4 presented in table 3.

Kin	A_e	A_π	δA_e (%)
4	-0.054	-0.067	1.8
3	-0.040	-0.046	0.0

Table 3: Electron and pion asymmetries
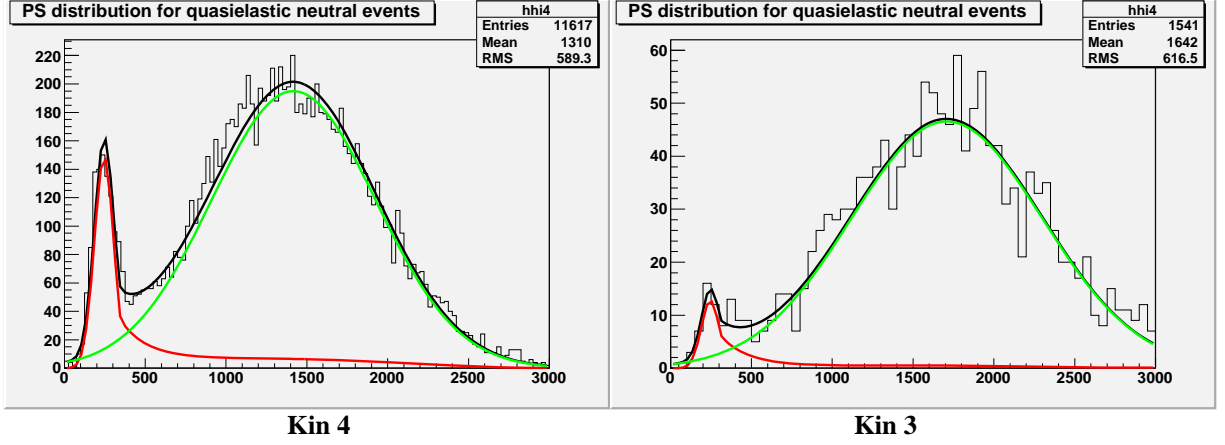

Kin 4   **Kin 3**

Figure 1: PS distribution for neutral quasielastic events. Red: fit for pions, obtained by fiting positive particles (fig 2). Green: Gaussian fit for electrons. Black: Resulting fit.
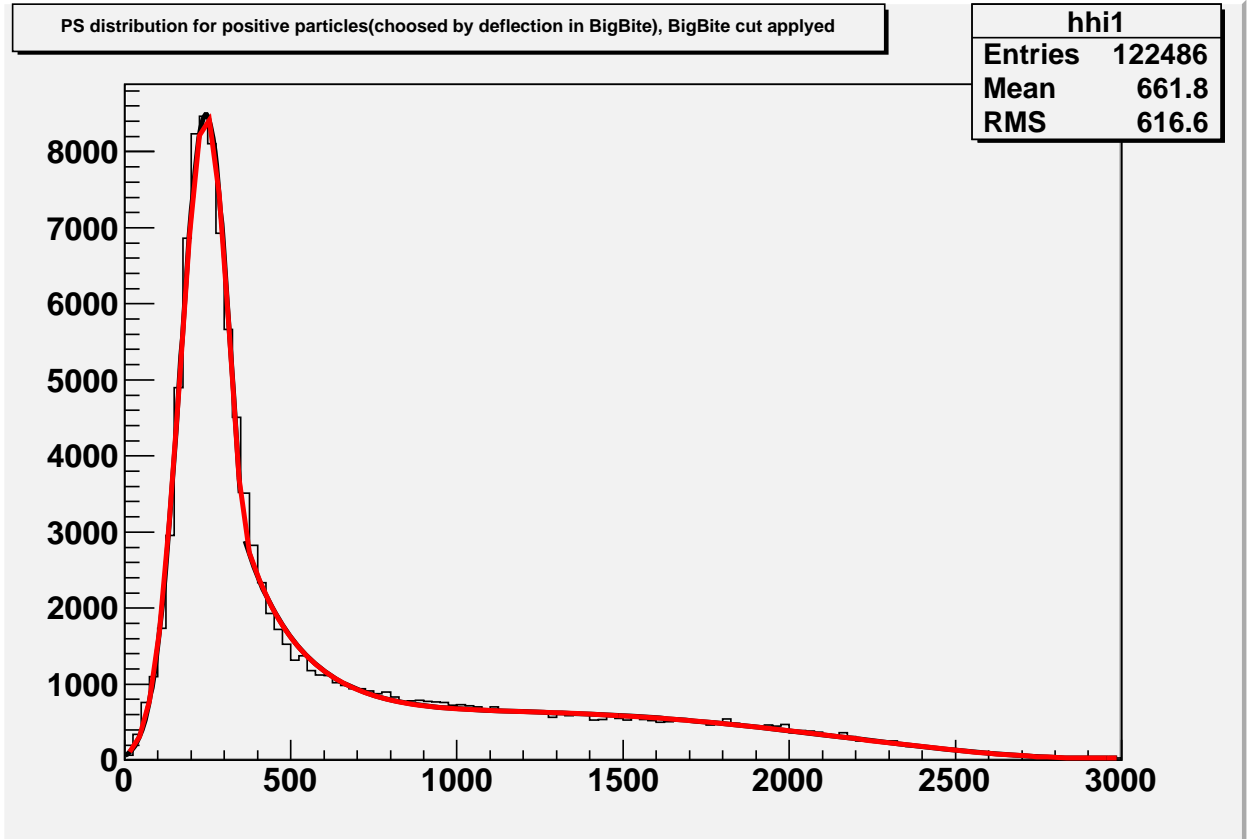

Figure 2: PS distribution for positive particles (choosed by deflection in BigBite). All standard BigBite cuts applied. Fit function was used to perform fit for pions in Figure 1.