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ЛАБОРАТОРИЯ ВЫСОКИХ ЭНЕРГИЙ

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Real-Time On-Line Programs for the π-p Elastic Scattering Experiment Using an HP 2116B Computer

On-line programs are described which control an experimental setup and analyse events by geometrical and kinematic criteria at the real time of the π-p elastic scattering experiment using an HP 2116B computer.

The present software is taken mostly from the software of the $pi-e$ scattering experiment [1,3]. The present experimental setup is described in ref. [2]. The program HSTAC and the subroutine PAIR (controlling program TRFIT) have been changed, these changes are described in this part of our paper.

I. Programs

The subroutine PAIR is scheduled by the program TRFIT. All other subroutines, except PAIR, controlled by TRFIT are not changed. PAIR analysed the events with one track in each block of the chamber only. The scattering angle of the primary particle, the Z coordinate of the scattering position along the beam, the scattered particle momentum, etc., were determined. For the scattering angle (of order of 10^{-3} radians) we used the formula

$$\theta = \sqrt{\theta_x^2 + \theta_y^2}$$

where θ_x and θ_y are the projections of the scattering angle in XOZ and YOZ views, respectively, θ is the scattering angle of the primary particle. In the view the scattered angle had the largest value, the Z coordinate of the scattering point was determined by

$$Z = (A_1 - A_2)/(B_2 - B_1),$$

where A is the intercept and B is the slope parameter of the tracks in the first and second blocks of the chambers.

The calculation of the Z coordinate was made only for those cases where the scattered angle exceeded the limiting value $\theta > 1$ mrad.

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The momentum of the scattered particles was defined by the formula

$$p = \frac{H}{X'_3 - X'_2},$$

where H is the appropriate constant for our analyzing magnet, (SP-12 with a field of 17 kilogauss); X'_3 and X'_2 are the slope parameters of the tracks, in the third and second blocks of the chambers, respectively.

The subroutine PAIR also calculated the values:

$$X_{23} = X_3 - X_2$$

$$Y'_{23} = Y'_3 - Y'_2$$

$$Y_{23} = Y_3 - Y_2$$

(the differences of the intercept and slope parameters - A and - B in adjacent blocks of chambers) which characterized the constants of the chamber system as well as other apparatus parameters.

The program HSTAC was changed to accumulate the histograms of results calculated by PAIR. In addition, there were some changes in the accumulation of the histograms from the ADC's which contained the value that characterized the particle scattering angle for this experiment.

II. Computer Output

The histograms that were changed for this experiment are described below.

102	Distribution of the longitudinal momentum of the secondary particles (p).
103	Scattered angle (θ) of the primary particle.
104	Histogram of the value $X'_2 - X'_1$ at the center of the target.
105	'' $X_2 - X_1$ '' ''
106	'' $Y'_2 - Y'_1$ '' ''
107	'' $Y_2 - Y_1$ '' ''
108-111	Distribution of the values $X'_3 - X'_2, X'_3 - X_2,$ $Y'_3 - Y'_2$, and $Y_3 - Y_2$ at the center of the magnet, respectively.

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References

1. G.T.Adylov et al. JINR Preprint, E1-6907, Dubna, 1973.
2. G.T.Adylov et al. JINR Preprint, E13-6658, Dubna, 1972.
3. G.T.Adylov et al. JINR Preprint, E1-6908, Dubna, 1973.

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