Hall C Reference

Experiment: HKS

Design of Enge Sieve Slit/Collimator

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Abstract

This Howto outlines the purpose of the Enge Sieve Slit/Collimator, its design parameters.

1 Purpose

The sieve slit is a collimator plate with array of holes that select events with specific angles. With a point target and recognition of the correlations of the focal plane parameters, these events separated into specific holes are used to optimize the angular reconstruction matrices.

On the same plate, an open collimator is made to basically match the Enge spectrometer acceptances in order to minimize the particles that may hit the irons inside the spectrometer.

There is also an un-collimated opening on the plate. This is an option in case a study of the blocking effect of the bremsstrahlung and Mollor electrons is needed using the lower edge.

2 Design

The electron arm is formed by Splitter dipole which separates the scattered electrons from oppositely charged kaons followed Enge spectrometer, the plate is behind the Splitter magnet. The location of the plate is 43 cm from downstream side of collimator plate to the effective field boundary of the first pole of Enge Split-Pole spectrometer. The plate has a thickness of 2.54 cm.

Since the plate is located inside of the overall optics with Splitter field in front of it, slight momentum dependence in the events selected from each hole appears. Thus the optimization procedure and method for the angular matrix are different from those used for the SOS and HMS spectrometers. Calibration method and procedure will be described in separate Howto.

Since the Enge is tilted up with respect to the virtual target position then shifted in Y in order to block the bremsstrahlung and Mollor electrons while remain minimum scattering angle, the overall optics has a "twist". This makes the acceptance not symmetric. Thus, the sieve slit hole pattern is not symmetric in X but designed basic on central optics and actual twisted acceptance. There are 6 columns and 5 raws. The hole at 3rd column and 3rd raw (counted from -X and -Y side) is on the Enge spectrometer Z-axis. Similarly, the size of the collimator is also not symmetric in X.

The hole size is 5 mm (0.2 inch) in diameter and is drilled normal to the plate. Thus this hole size is to ensure the angular reconstruction accuracy better than 2 mr in σ under the given focal plate angular measurement accuracy and at same time to obtain sufficient event rate.