Hall C Reference

Tilt Parameters Optimization for Enge Spectrometer

Yuichi Okayasu

March 11, 2005

Abstract

This reference gives principal to optimize the tilt parameters of Enge spectrometer.

1 Purpose

We introduce a new experimental geometry so called "Tilt method" for the Enge spectrometer.
In the "Tilt method" configuration, Enge spectrometer is tilted vertically to the splitter dispersive plane in order to exclude background factor such as bremsstrahlung, Møller electrons as shown in Fig. 1, below to the detection limit of the Enge drift chamber.

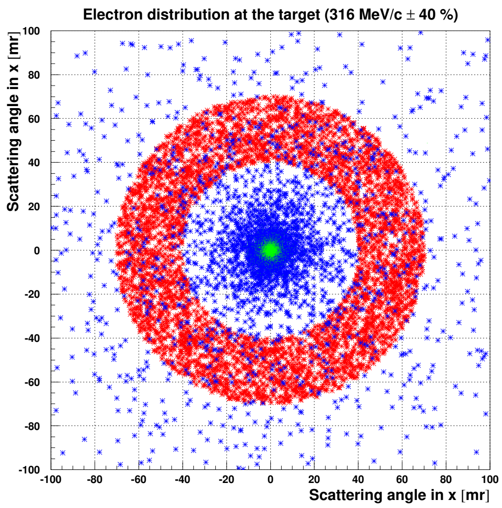

Fig. 1: Three processed electrons; associated with Λ production(blue), bremsstrahlung(green) and Møller(red) scattering at the target position.

2 Tilt parameters optimization

The "Tilt method" parameters; tilt angle and vertical offset are defined as shown in Fig. 2. Each parameter was optimized using a RAYTRACE and Monte Carlo simulation. Fig. 3 represents relative electron rates dependence on the Enge tilt angle and vertical offset for virtual photon, Møller scattering and bremsstrahlung electrons. Finally, the tilt angle and offset were optimized as 7.75 degs and -6.0 cm, respectively with ∼300 kHz of the background rate.

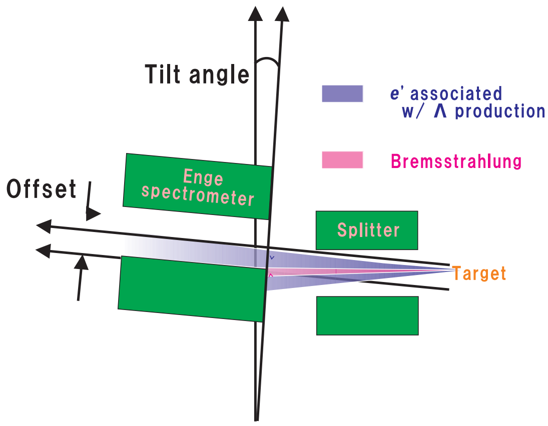

Fig. 2: Schematic view of the "Tilt method" configuration.

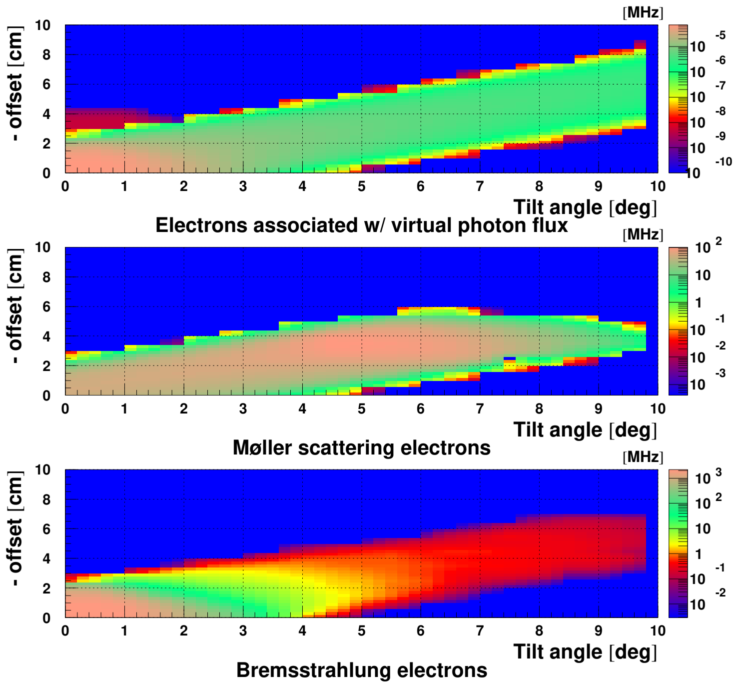

Fig. 3: Correlations between tilt parameters and expected detection rate on the Enge focal plane for the three processed electrons.