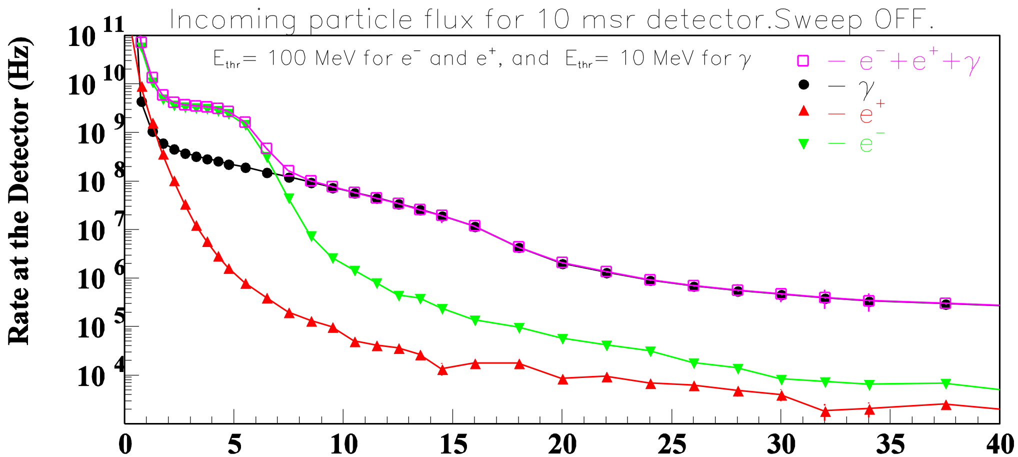
The Flux of incoming particles. Sweep OFF

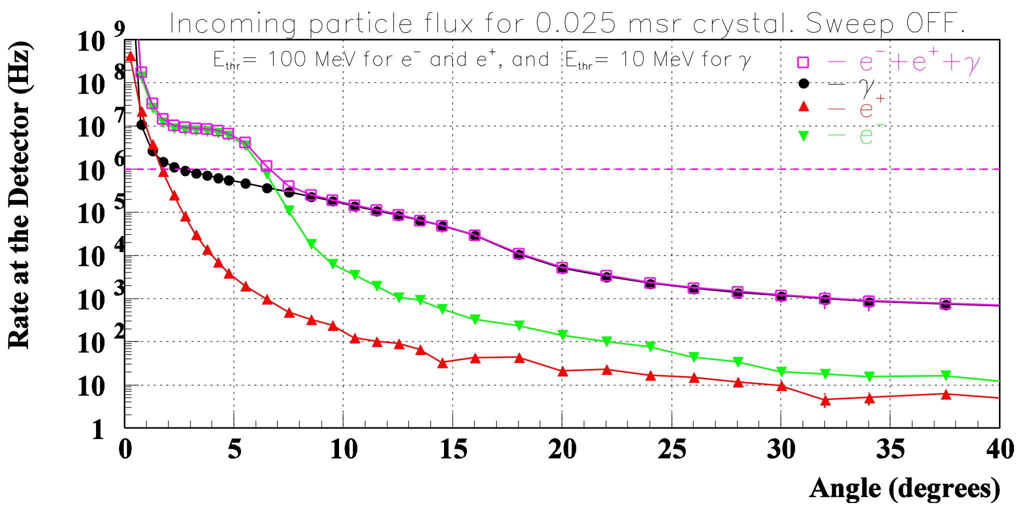
The flux of the particles at the face of the π^0 detector and single module as a function of the angle at energy thresholds 10 MeV for photons and 100 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam energy: 6.6 GeV
Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target. The crystal sizes were taken 2.0 cm ×2.0 cm corresponding to 0.025 msr solid angle at distance 4.0 m.



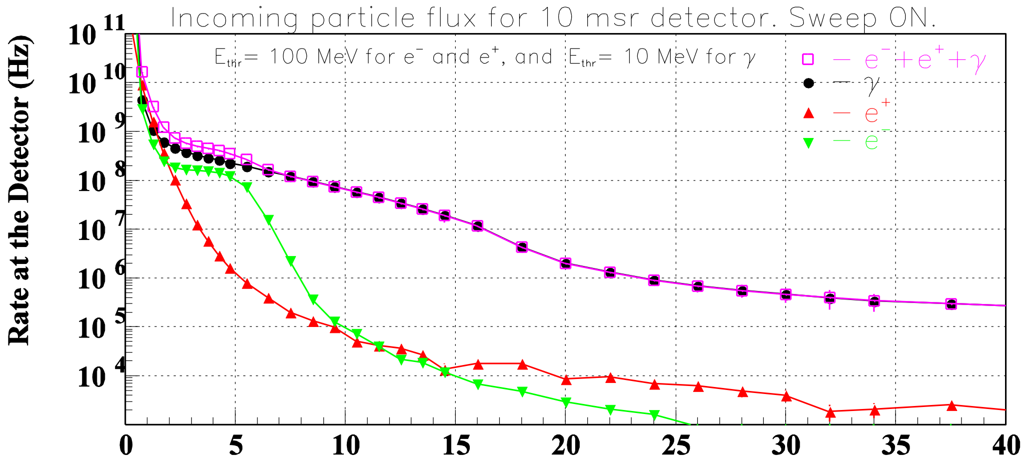
The major sources of the background are the target-induced rates. The beam line components contribution ~20%.

For this simulation we had assumed an envisioned beam pipe.

The Flux of incoming particles. Sweep ON

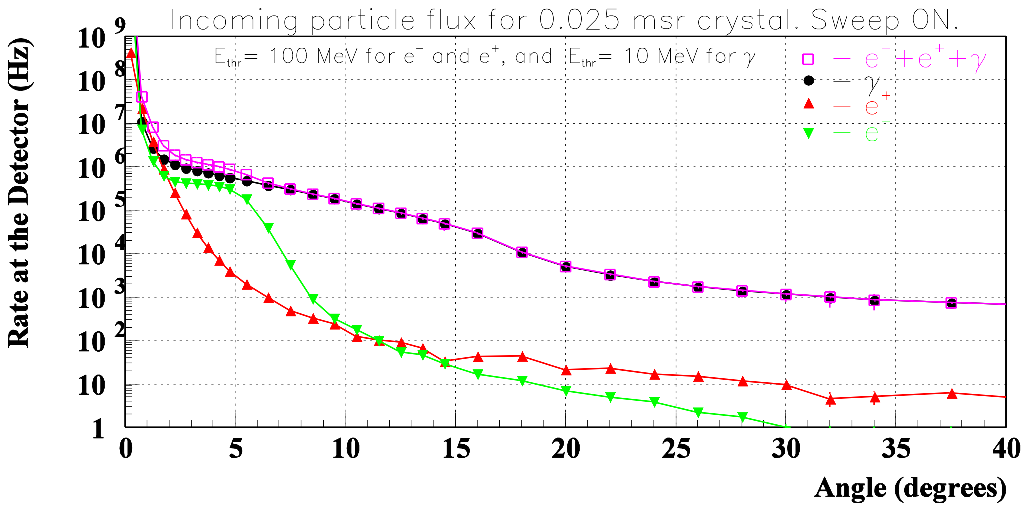
The flux of the particles at the face of the π^0 detector and single module as a function of the angle at energy thresholds 10 MeV for photons and 100 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam energy: 6.6 GeV
Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target. The crystal sizes were taken 2.0 cm ×2.0 cm corresponding to 0.025 msr solid angle at distance 4.0 m.



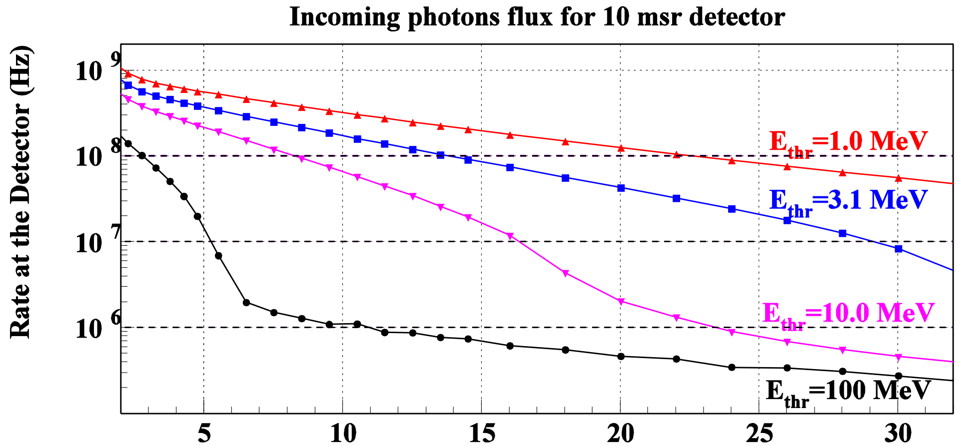
The major sources of the background are the target-induced rates. The beam line components contribution ~20%.

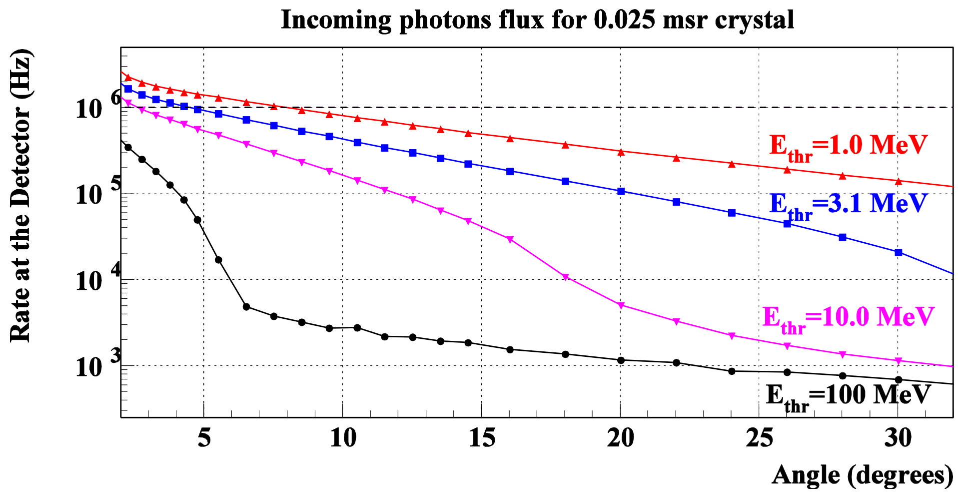
For this simulation we had assumed an envisioned beam pipe.

The Flux of the Low Energy Photons

The flux of the γ at the face of the π^0 detector and single module as a function of the angle at energy thresholds 1.0, 3.1, 10 and 100 MeV.

(Based on Pavel Degtiarenko simulations.)





Beam energy: 6.6 GeV
Beam current: 1.0 μA
Target: 10 cm LH2

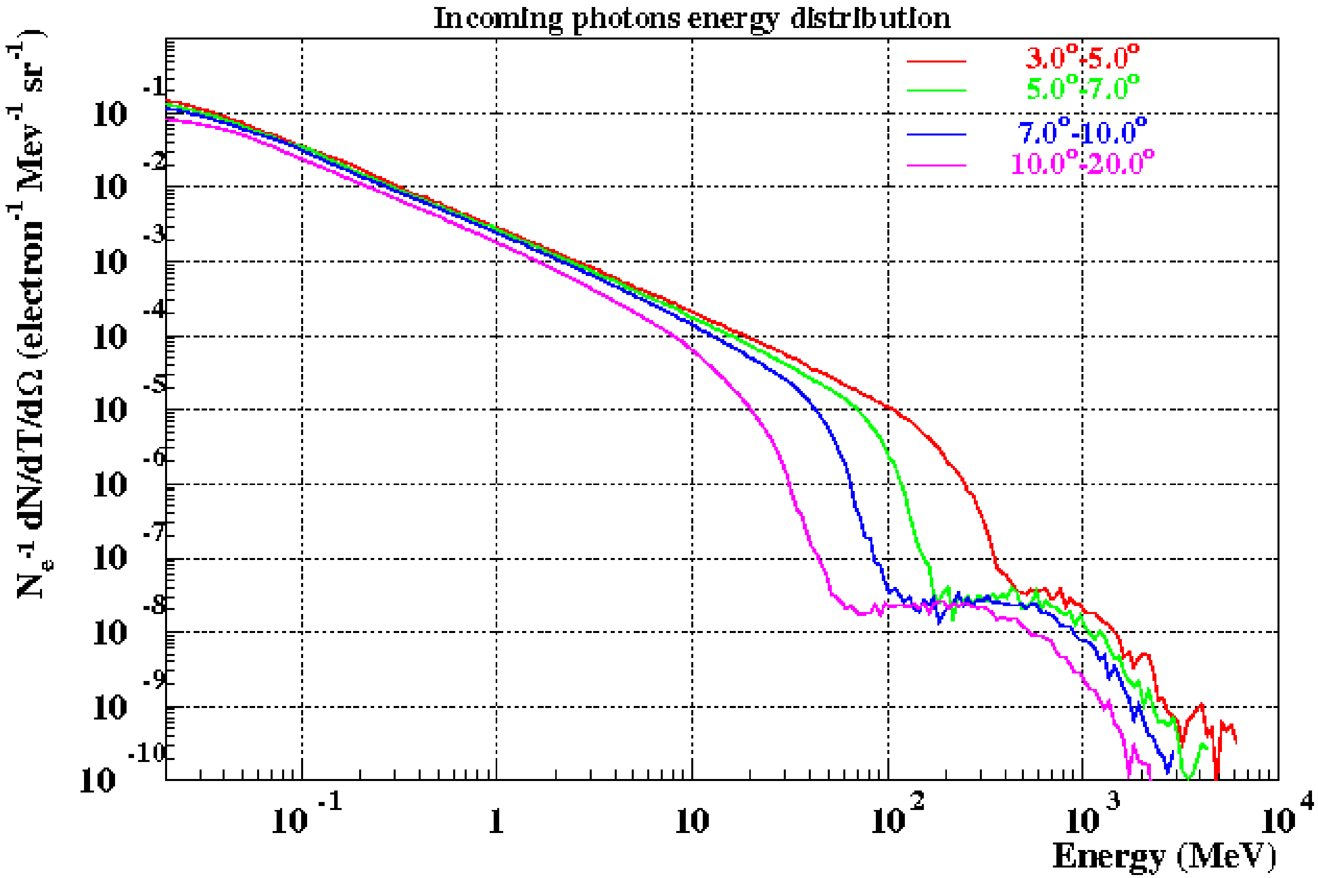
Pi0-detector at the distance of 4.0 m from the target. The crystal sizes were taken 2.0 cm ×2.0 cm corresponding to 0.025 msr solid angle at distance 4.0 m.

The major sources of the background are the target-induced rates. The beam line components contribution ~20%.

For this simulation we had assumed an envisioned beam pipe.

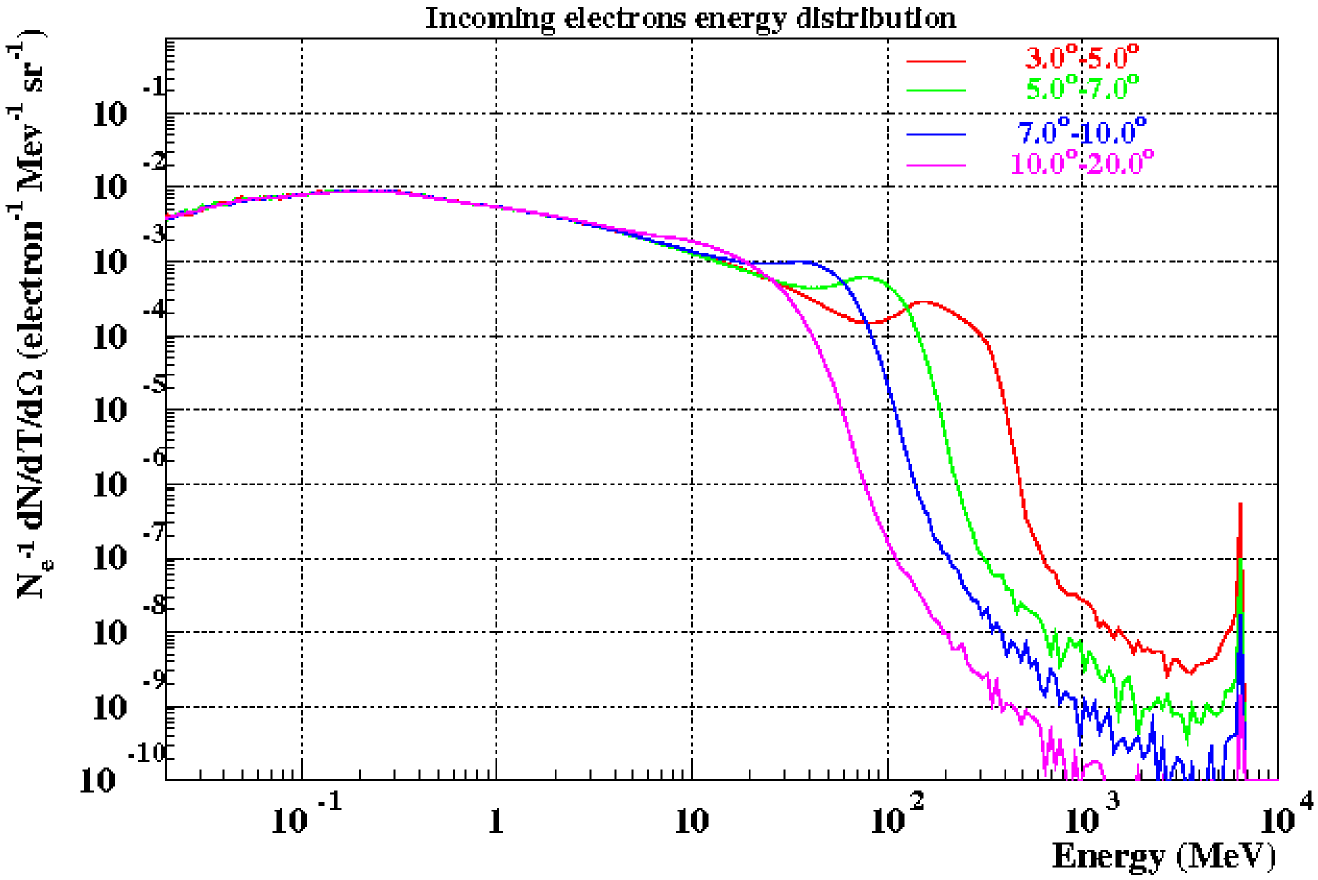
Energy Spectrum of the Photons

(Based on Pavel Degtiarenko simulations for the beam energy 6.6 GeV)



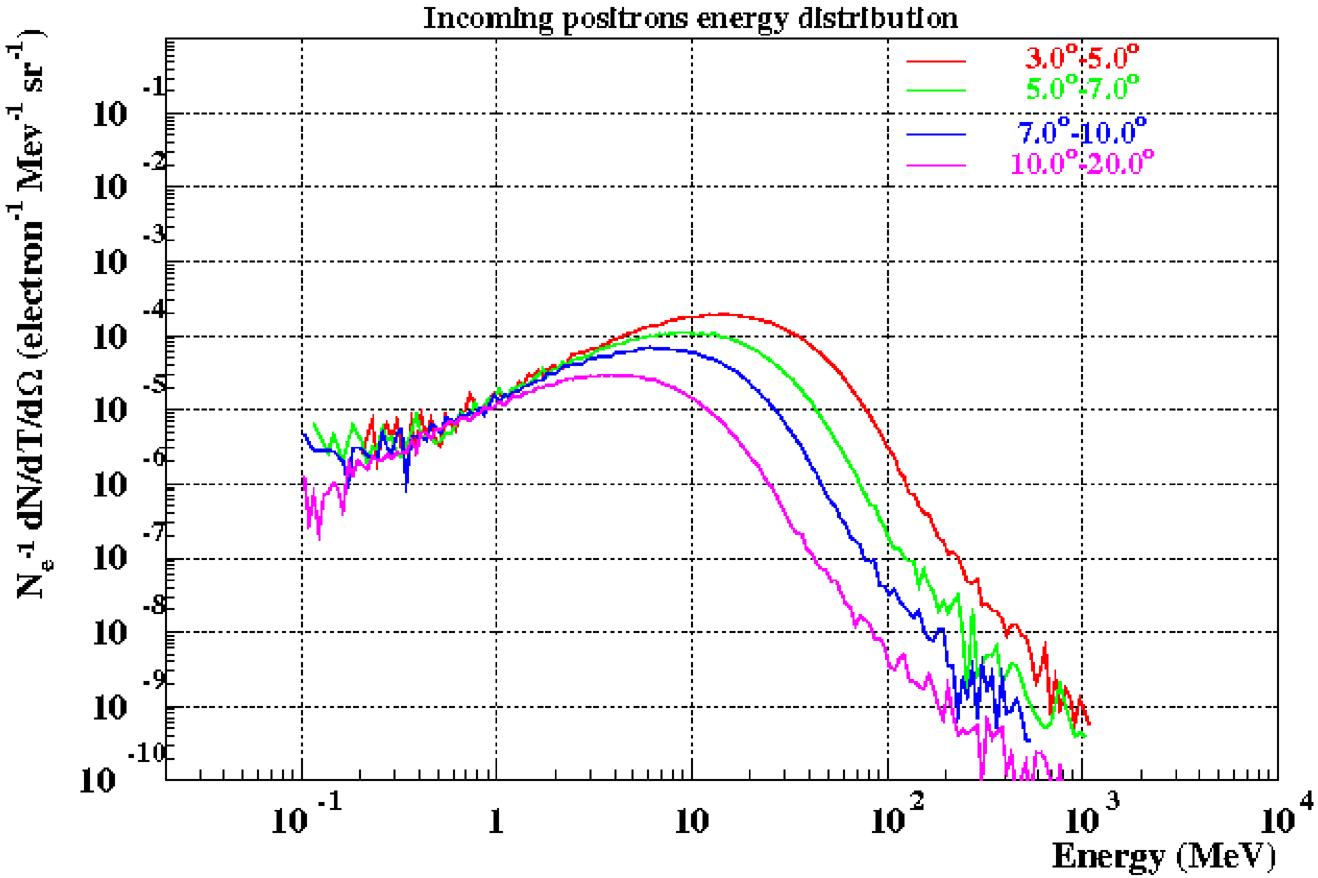
Energy Spectrum of the Electrons

(Based on Pavel Degtiarenko simulations for the beam energy 6.6 GeV)



Energy Spectrum of the Positrons

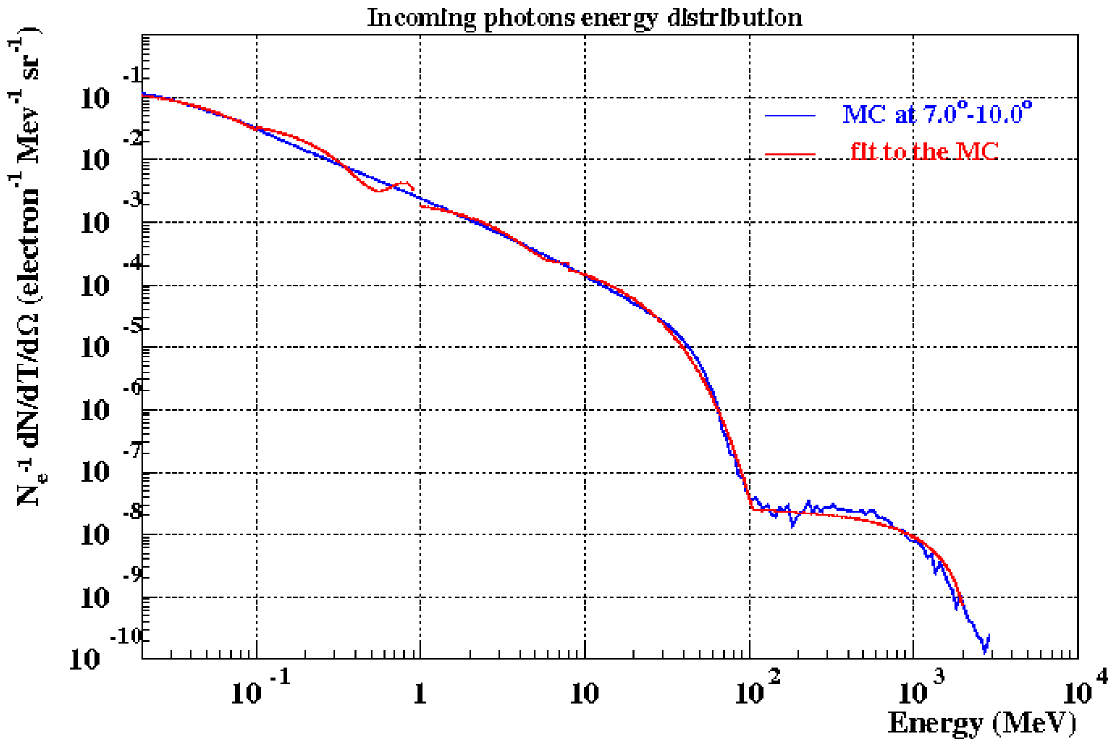
(Based on Pavel Degtiarenko simulations for the beam energy 6.6 GeV)



$f = 0.14895 - 2.3667 \cdot x + 15.415 \cdot x^2 - 2.35652 \cdot x^3 \quad \text{for} \quad 0.01 < E < 0.1\,\text{MeV}$

Fit of the Photons Energy Spectrum

(Based on Pavel Degtiarenko simulations for the beam energy 6.6 GeV)



All energy range have been divided in several sections and fitted independently.
The blue line is a Pavel's MC data, the red colour lines are shown the fit functions.
For background studies one can use fit functions or data table (which can be provided).

$$f = 0.14895 - 2.3667 \cdot x + 15.415 \cdot x^2 - 35.652 \cdot x^3 \quad \text{for} \quad 0.01 < E < 0.1\,\text{MeV}$$

$$f = 0.53733E-01 - 0.23643 \cdot x + 0.36084 \cdot x^2 - 0.17818 \cdot x^3 \quad \text{for} \quad 0.1 < E < 0.9\,\text{MeV}$$

$$f = 0.26845E-02 - 0.99676E-03 \cdot x + 0.13550E-03 \cdot x^2 - 0.61838E-05 \cdot x^3 \quad \text{for} \quad 1.0 < E < 8.0\,\text{MeV}$$

$$f = \exp(-7.9304 - 0.091089 \cdot x) \quad \text{for} \quad 8.0 < E < 105\,\text{MeV}$$

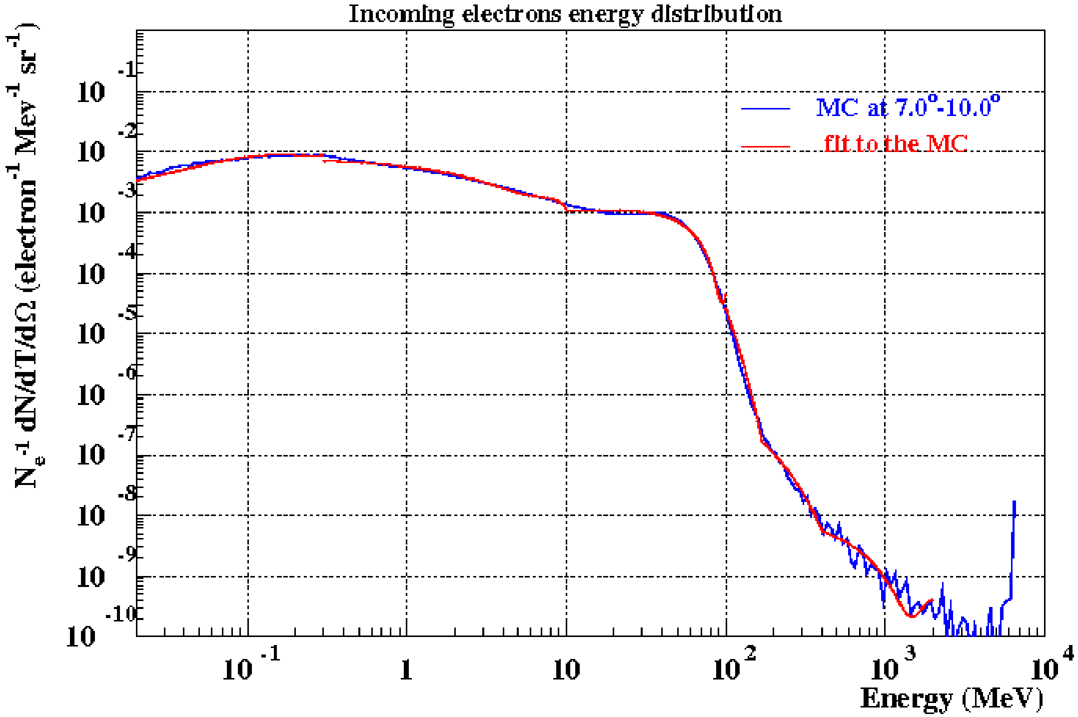
$$f = 0.26626E-07 - 0.21915E-10 \cdot x + 0.44752E-14 \cdot x^2 \quad \text{for} \quad 105 < E < 2000\,\text{MeV}$$

Neglecting photons with energy below 1MeV, we may use only last three functions (for E> 1 MeV).

$f = 0.10727E-02 + 0.12552 \cdot x - 0.63569 \cdot x^2 + 1.0173 \cdot x^3 \quad \text{for} \quad 0.01 < E < 0.3\,\text{MeV}$

Fit of the Electrons Energy Spectrum

(Based on Pavel Degtiarenko simulations for the beam energy 6.6 GeV)



All energy range have been divided in several sections and fitted independently.
The blue line is a Pavel's MC data, the red colour lines are shown the fit functions.
For background studies one can use fit functions or data table (which can be provided).

$f = 0.10727E-02 + 0.12552 \cdot x - 0.63569 \cdot x^2 + 1.0173 \cdot x^3 \quad \text{for} \quad 0.01 < E < 0.3\,\text{MeV}$

$f = 0.77895E-02 - 0.23587E-02 \cdot x + 0.31988E-03 \cdot x^2 - 0.15034E-04 \cdot x^3 \quad \text{for} \quad 0.3 < E < 10\,\text{MeV}$

$f = 0.85816E-03 + 0.25322E-04 \cdot x - 0.80438E-06 \cdot x^2 + 0.46978E-08 \cdot x^3 \quad \text{for} \quad 10 < E < 100\,\text{MeV}$

$f = \exp(-3.2370 - 0.72822E-01 \cdot x) \quad \text{for} \quad 100 < E < 170\,\text{MeV}$

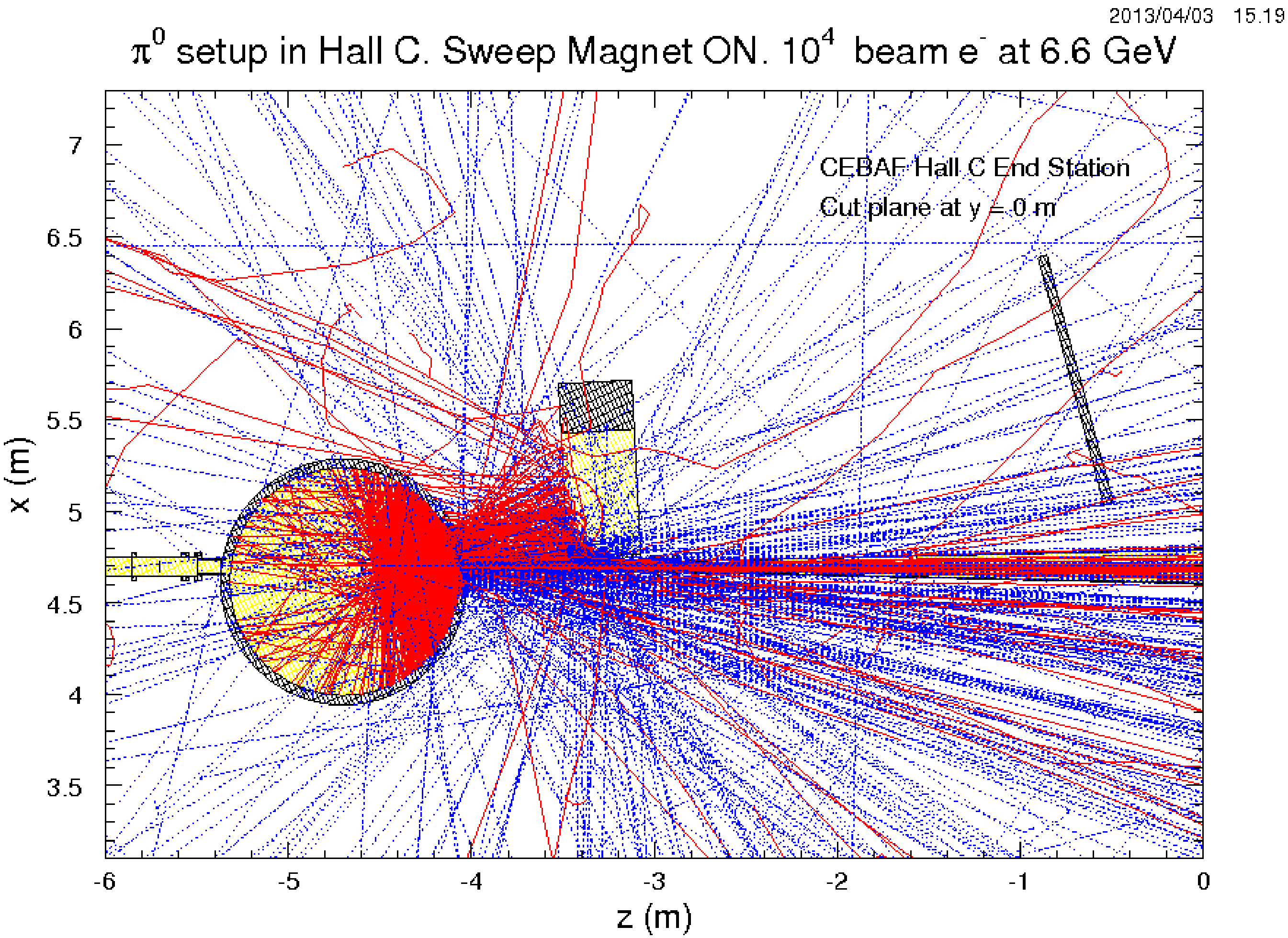
$f = \exp(-13.176 - 0.14409E-01 \cdot x) \quad \text{for} \quad 170 < E < 400\,\text{MeV}$

$f = 0.12215E-07 - 0.21524E-10 \cdot x + 0.12631E-13 \cdot x^2 - 0.24103E-17 \cdot x^3 \quad \text{for} \quad 400 < E < 2000\,\text{MeV}$

Assuming sweep magnet is ON, we need to take into account only last two functions for E > 170 MeV.

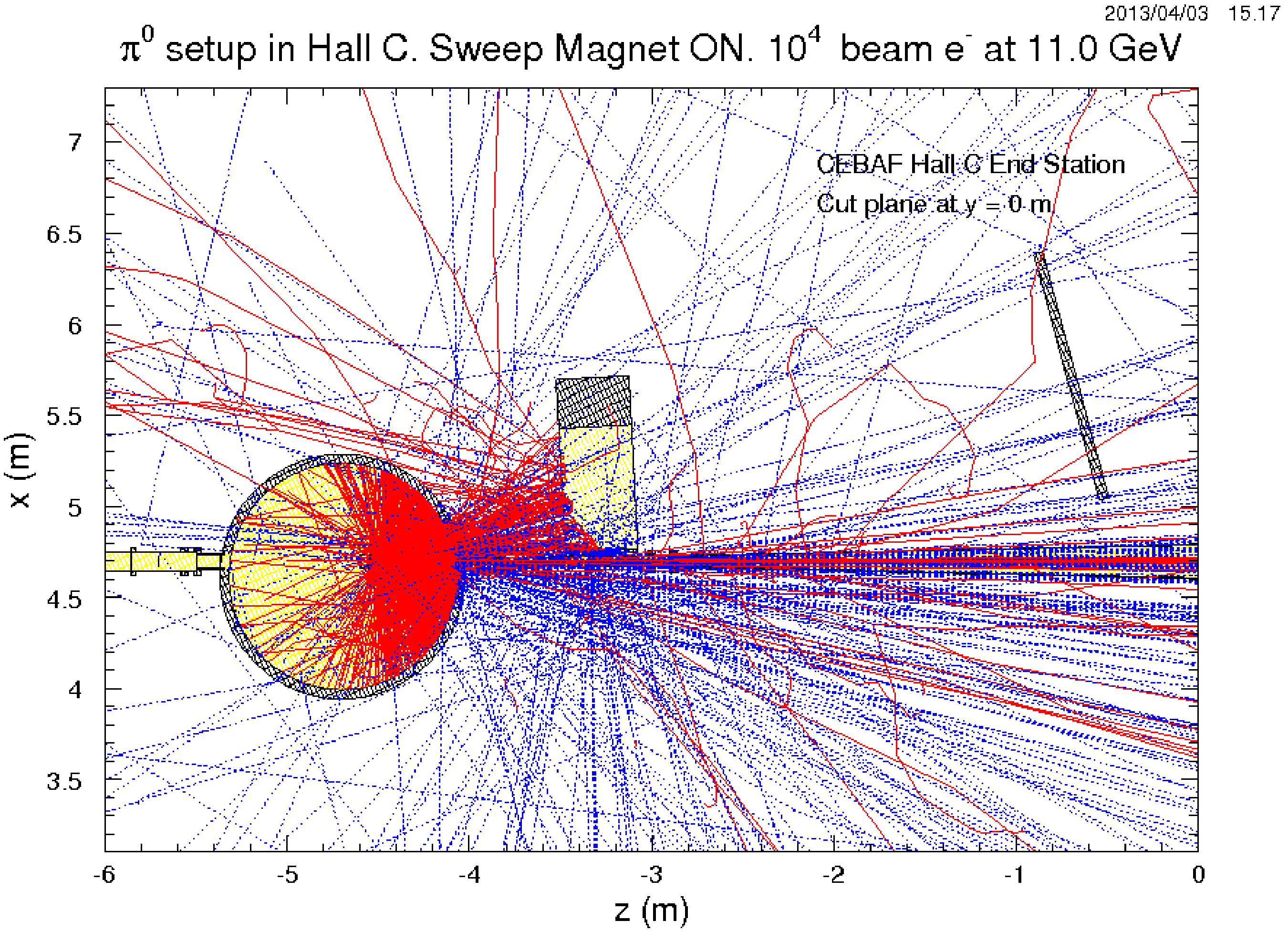
Trajectories for the electrons and photons at 6.6 GeV. Sweep ON.

(Based on Pavel Degtiarenko simulations)



Trajectories for the electrons and photons at 11 GeV. Sweep ON.

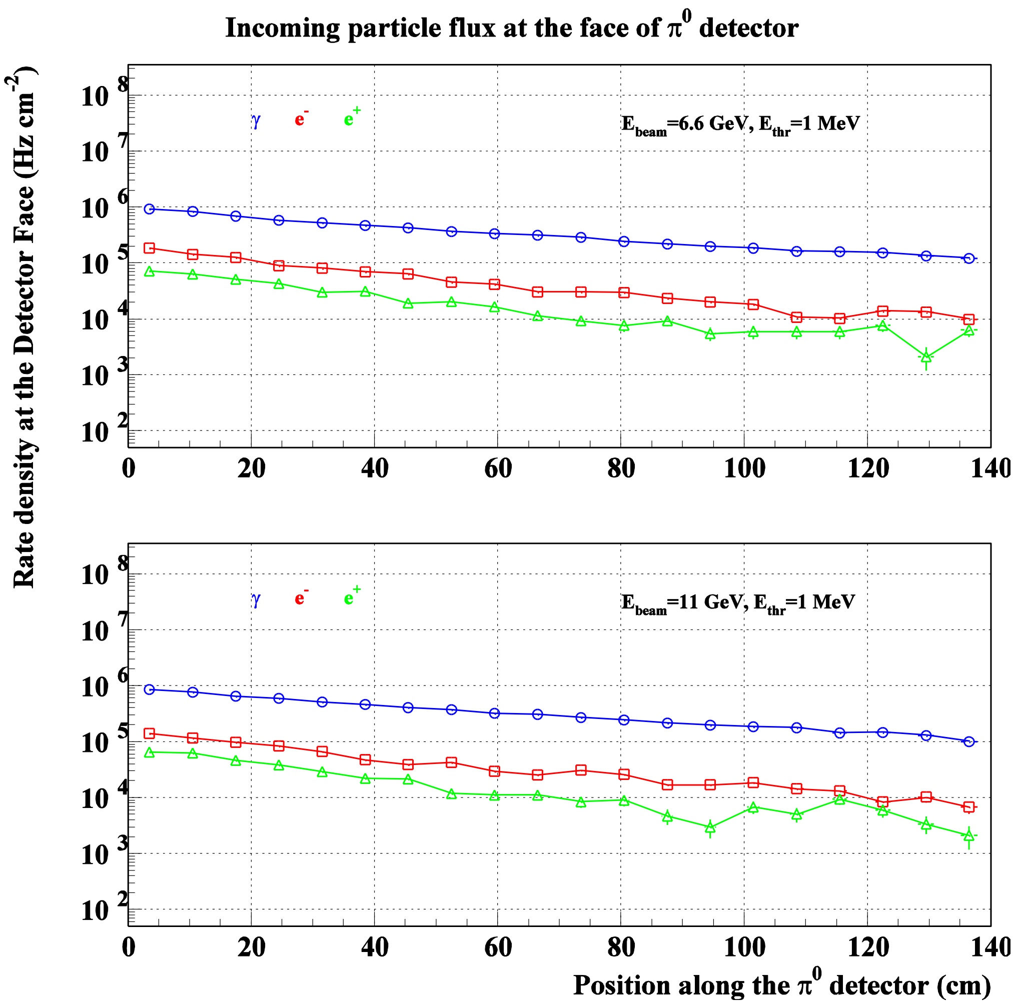
(Based on Pavel Degtiarenko simulations)



The Flux of the Low Energy Particles

The flux of the photons, electrons and positrons at the face of the π^0 detector as a function of the position along the detector at beam energy 6.6 and 11 GeV, and thresholds 1.0 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target.

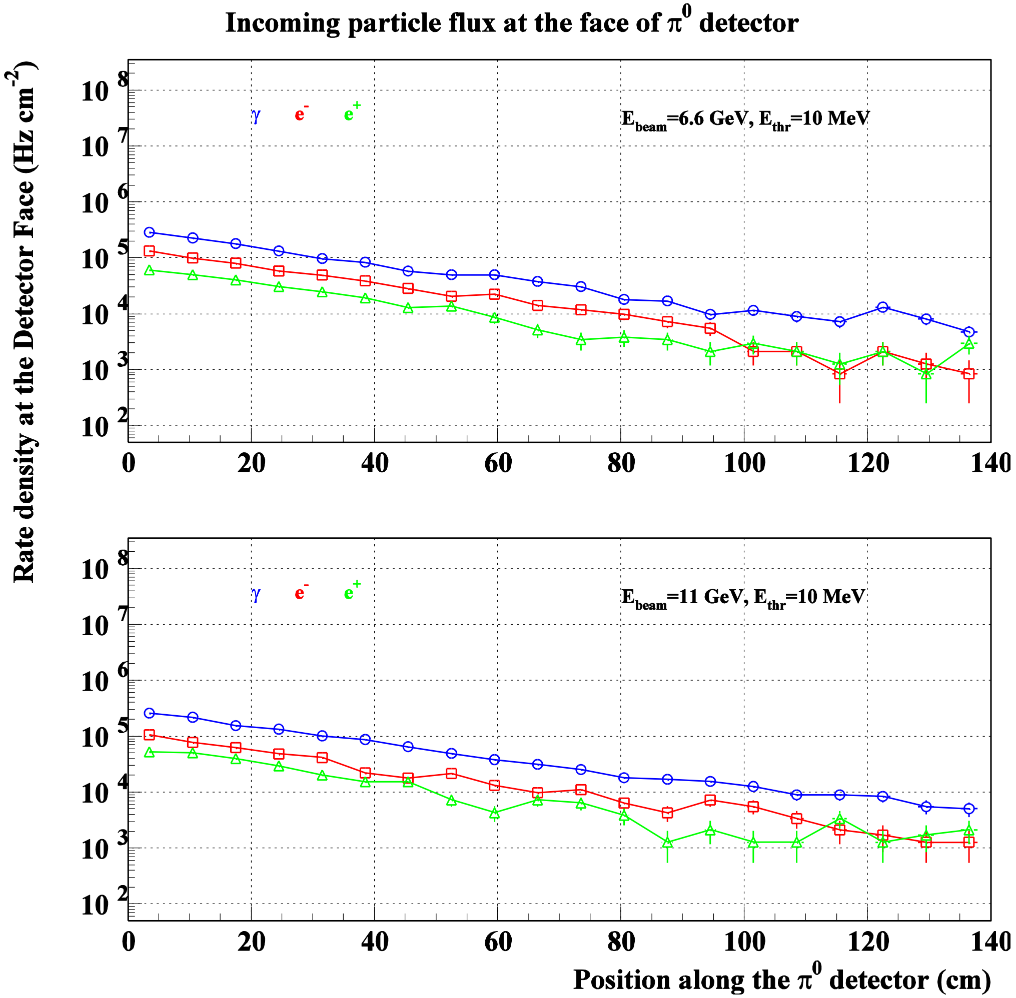
The major sources of the background are the target-induced rates. The beam line components contribution ~20%.

For this simulation we had assumed an envisioned beam pipe.

The Flux of the Low Energy Particles

The flux of the photons, electrons and positrons at the face of the π^0 detector as a function of the position along the detector at beam energy 6.6 and 11 GeV, and thresholds 10.0 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target.

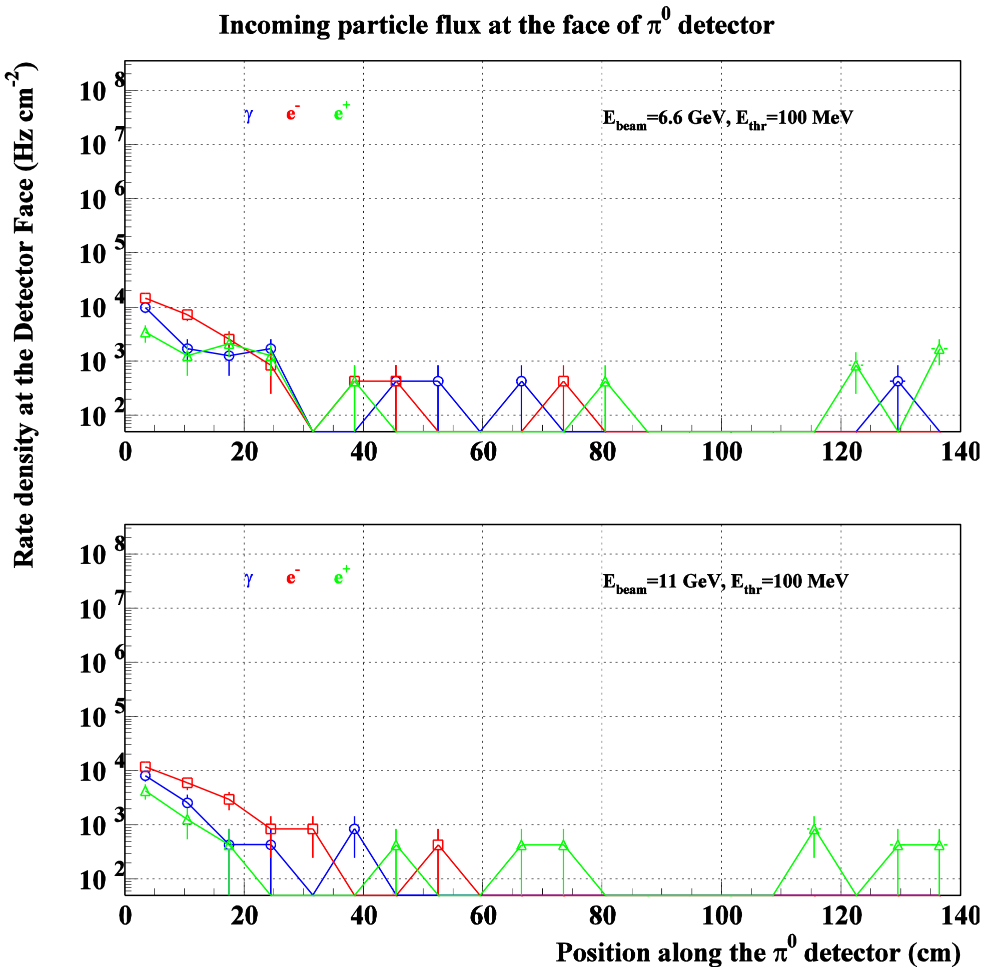
The major sources of the background are the target-induced rates. The beam-line components contribution ~20%.

For this simulation we had assumed an envisioned beam pipe.

The Flux of the Low Energy Particles

The flux of the photons, electrons and positrons at the face of the π^0 detector as a function of the position along the detector at beam energy 6.6 and 11 GeV, and thresholds 100 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target.

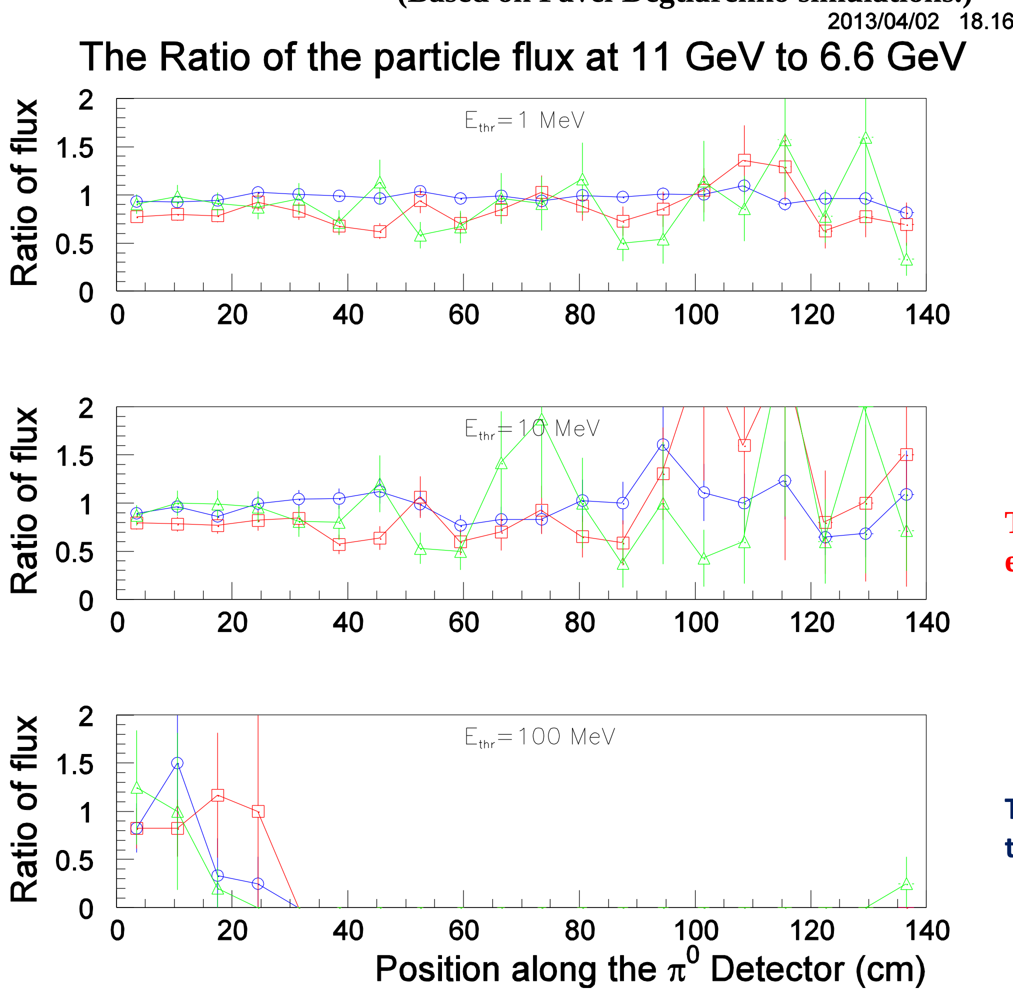
The major sources of the background are the target-induced rates. The beam-line components contribution ~20%.

For this simulation we had assumed an envisioned beam pipe.

The Ratio of the particle Flux at 11 GeV and 6.6 GeV

The ratio of the flux of the photons, electrons and positrons at beam energy 6.6 and 11GeV, as a function of position along the detector at thresholds 1, 10 and 100 MeV.

(Based on Pavel Degtiarenko simulations.)



Beam current: 1.0 μA
Target: 10 cm LH2

Pi0-detector at the distance of 4.0 m from the target.

The background condition for the beam energies 6.6 and 11 GeV nearly similar.

The particle flux variation below ~20% with the beam energy change from 6.6 to 11 GeV.

For this simulation we had assumed an envisioned beam pipe.

CONCLUSSION

- The background condition for the beam energies 6.6 and 11 GeV nearly similar
- The major sources of the background are the target-induced rates.
- The beam-line components contribution on the level of ~10-20 %