Optimization of polarized positron target thickness

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Parameters

Thickness

- Tungsten target
- Z=74
- Thickness = 100 μm

Initial electron beam

- Kinetic energy = 10 MeV/c
- Px=0,
- Py=0
- Pz=10 MeV/c

Steps

1 Positrons analysis

Positrons yield and FOM

2 Validation of results

Comparing with Dumas's results

3 Setting optimum thickness

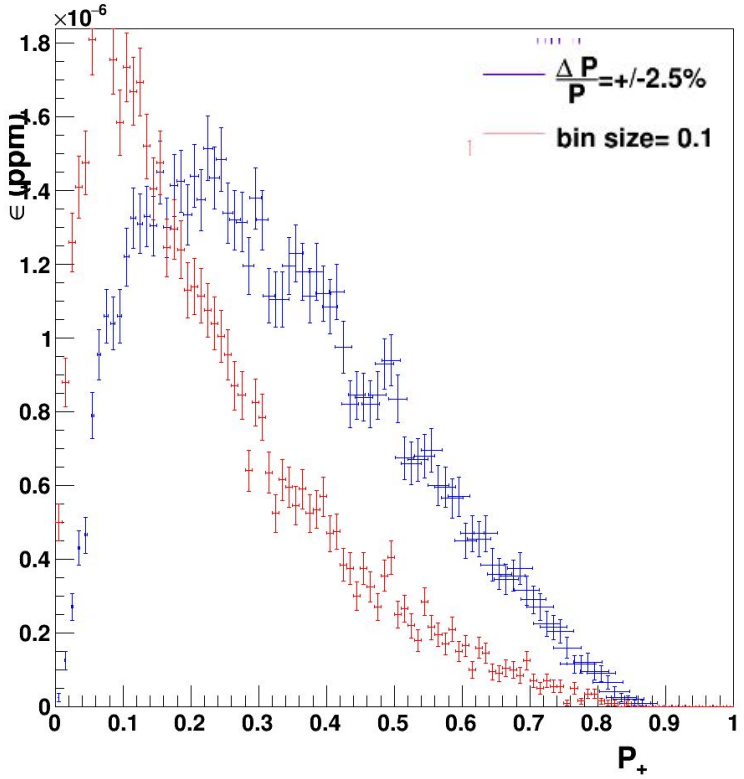
According to the angular cuts and the momentum acceptance

Positrons efficiency & FOM

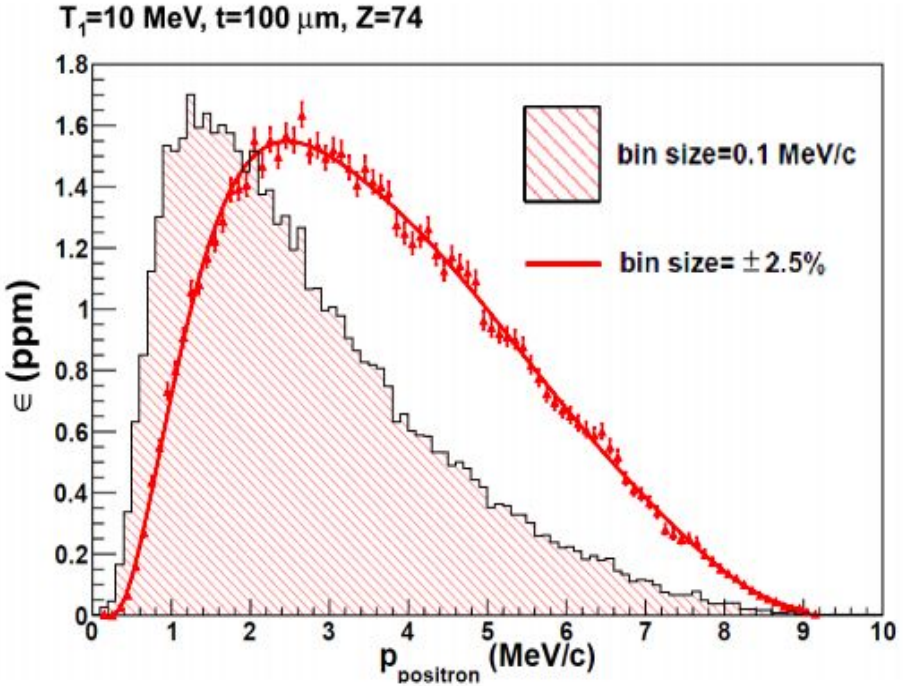
1. efficiency=N Positron/N electrons
2. FOM=yield *P**2

e^+ Efficiency

Using last Geant4 release

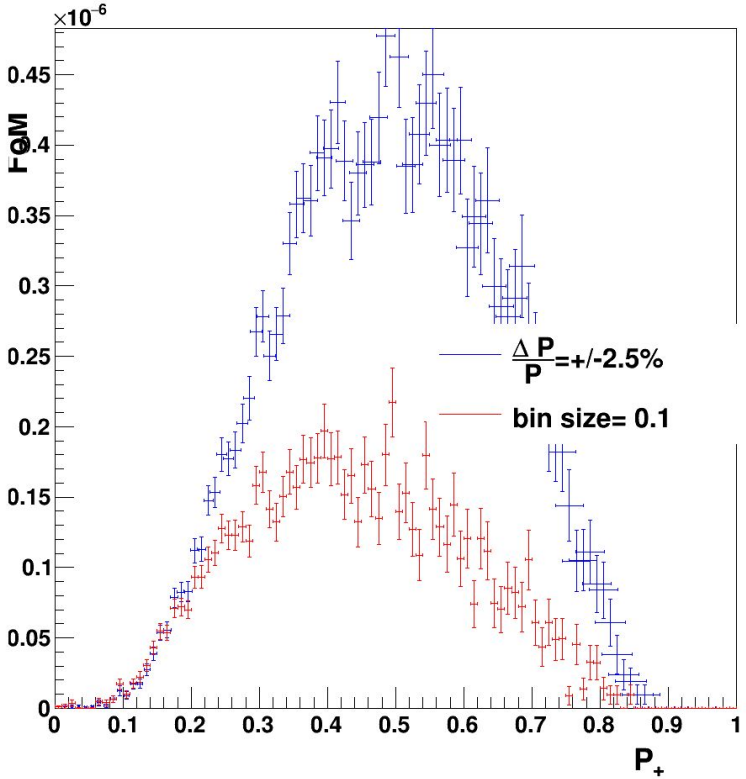


Duma's results

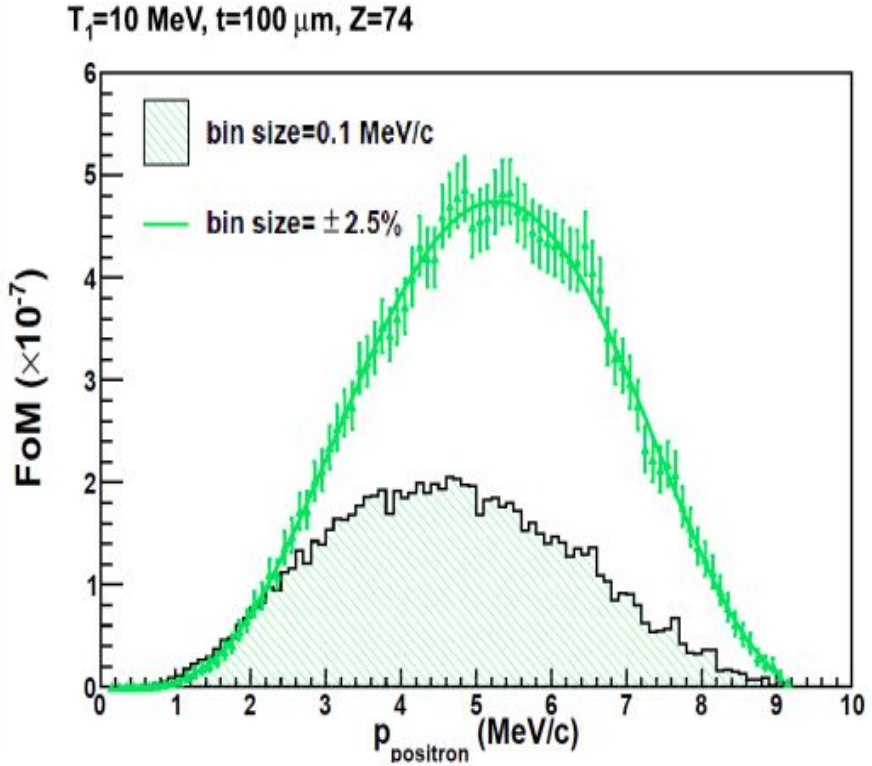


e^+ FOM

Using last Geant4 release

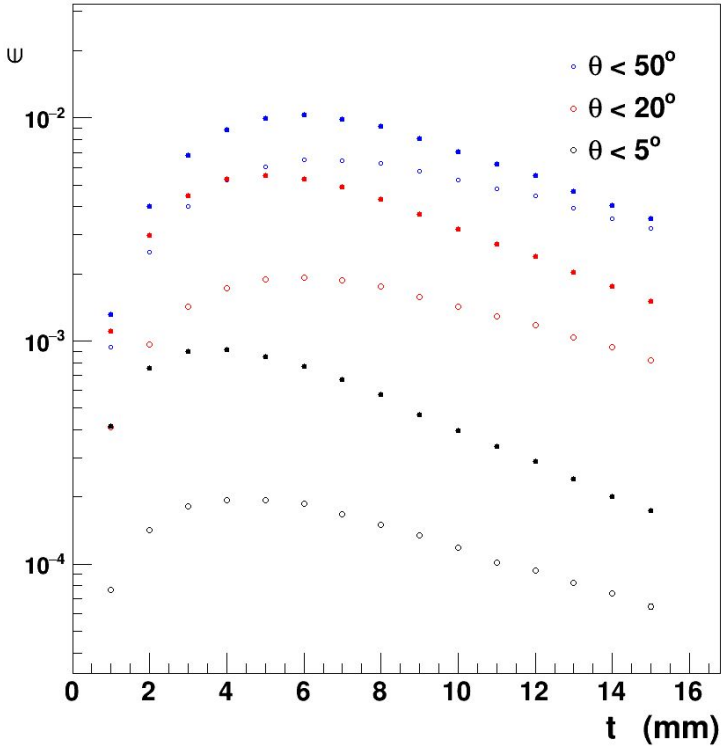


Duma's results

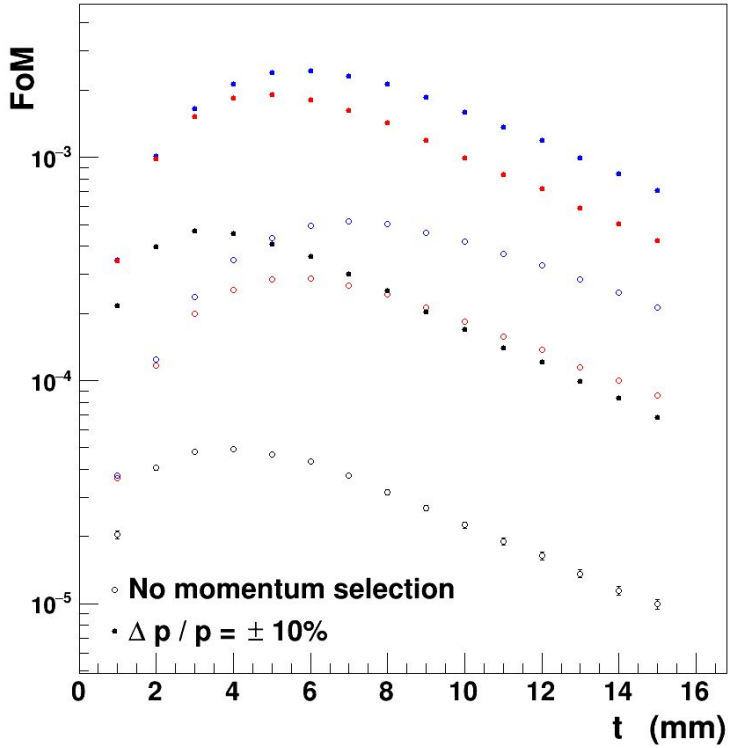


e^- At 120 MeV

e+ optimum Efficiency

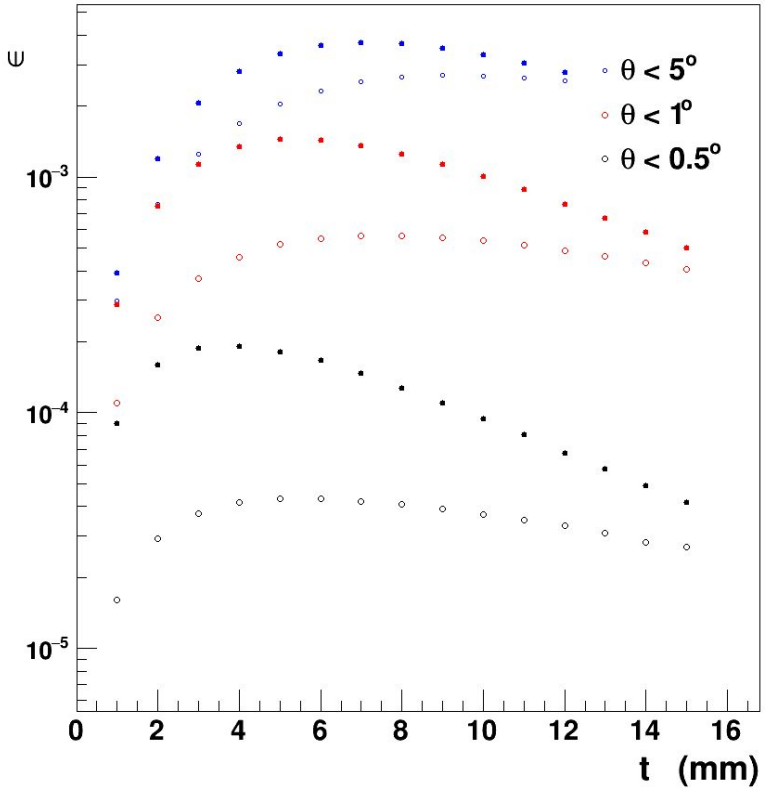


e+ optimum FoM

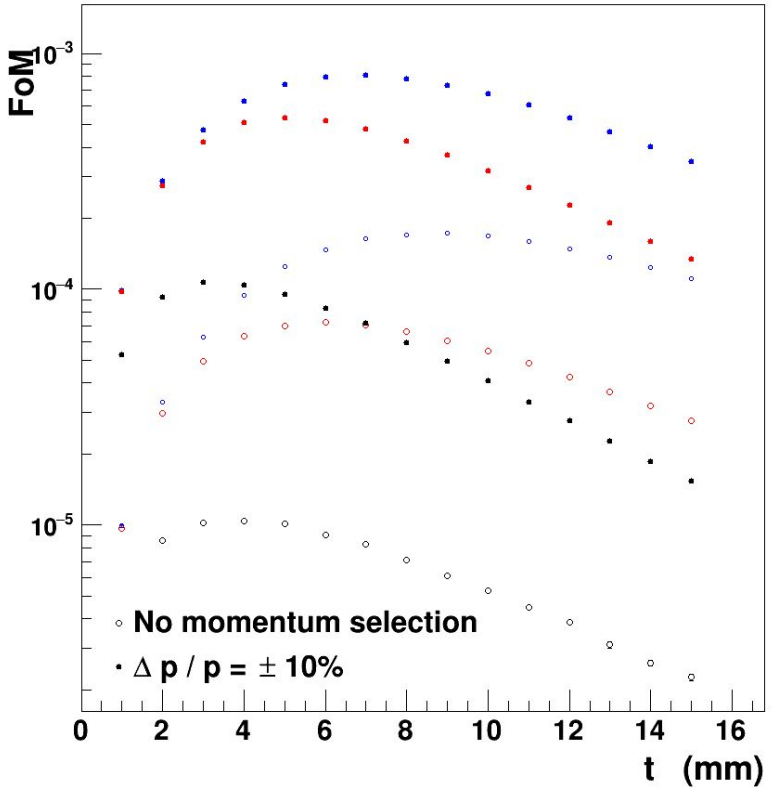


e^- At 1 GeV

e+ optimum Efficiency

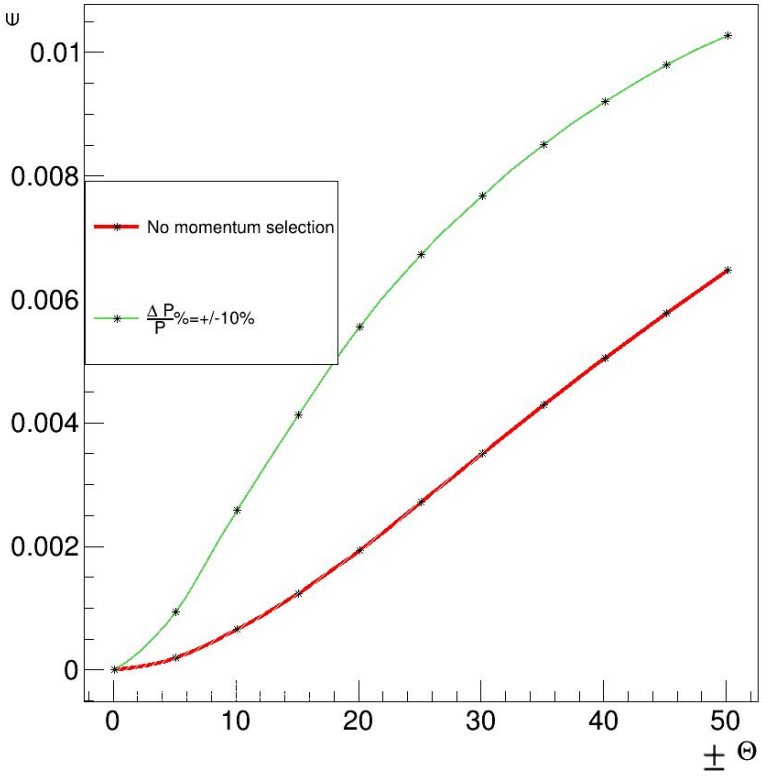


e+ optimum FoM

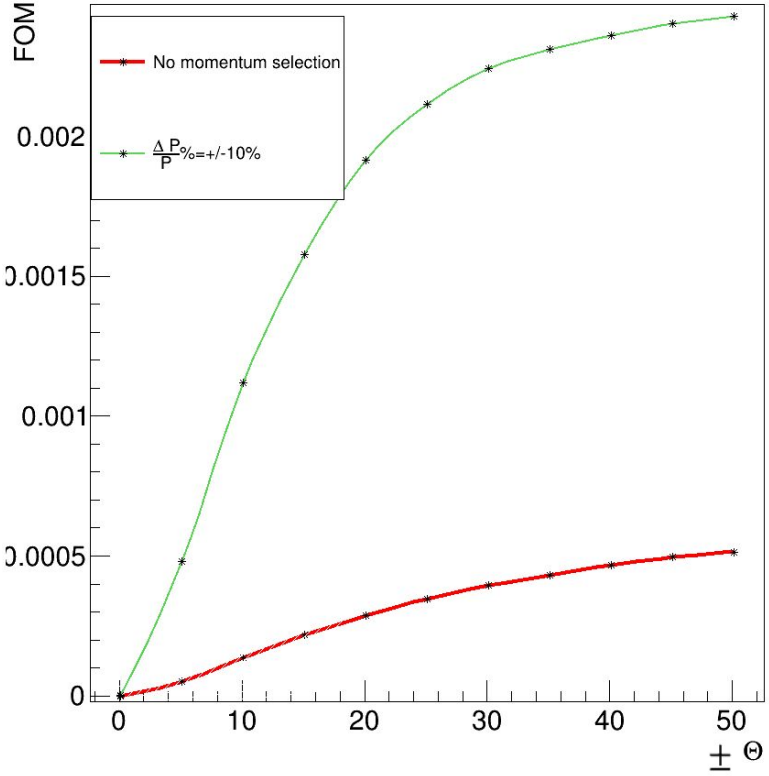


e^- At 120 MeV

Optimum efficiency e+

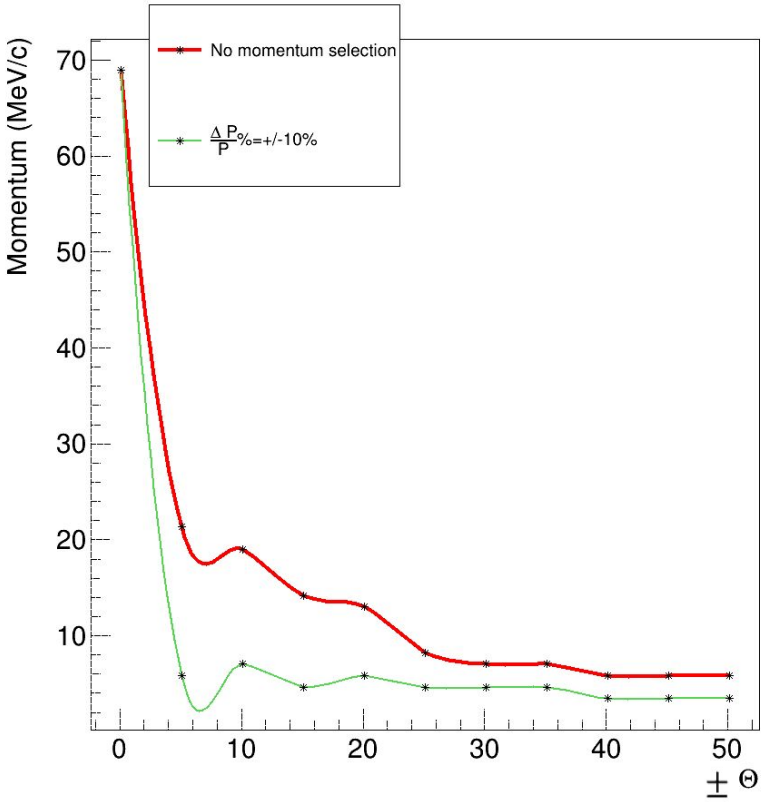


Optimum FOM for e+

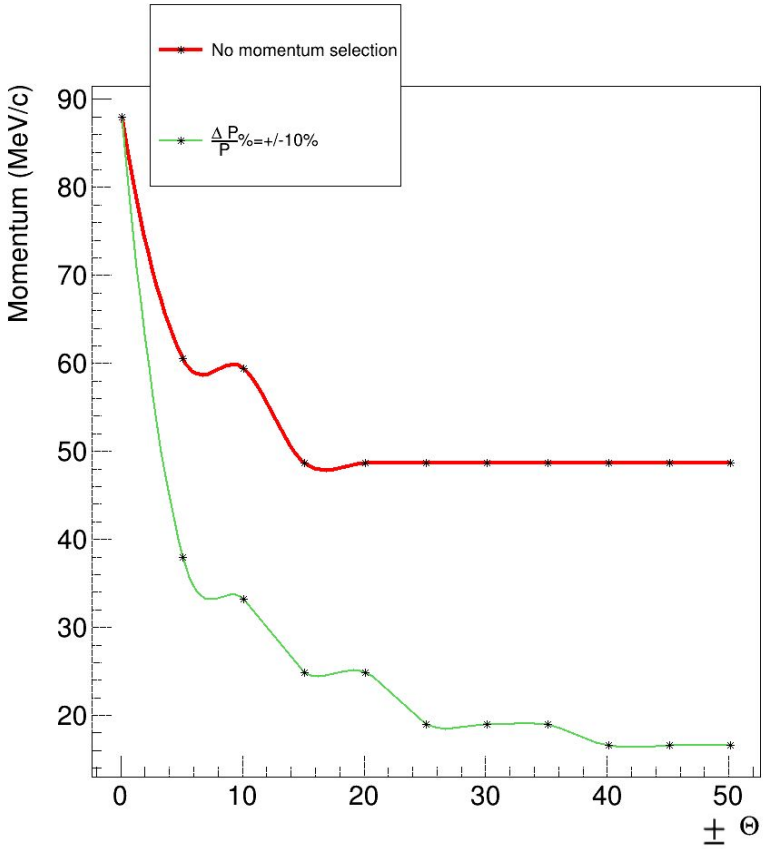


e^- At 120 MeV

e+ momentum at efficiency optimum

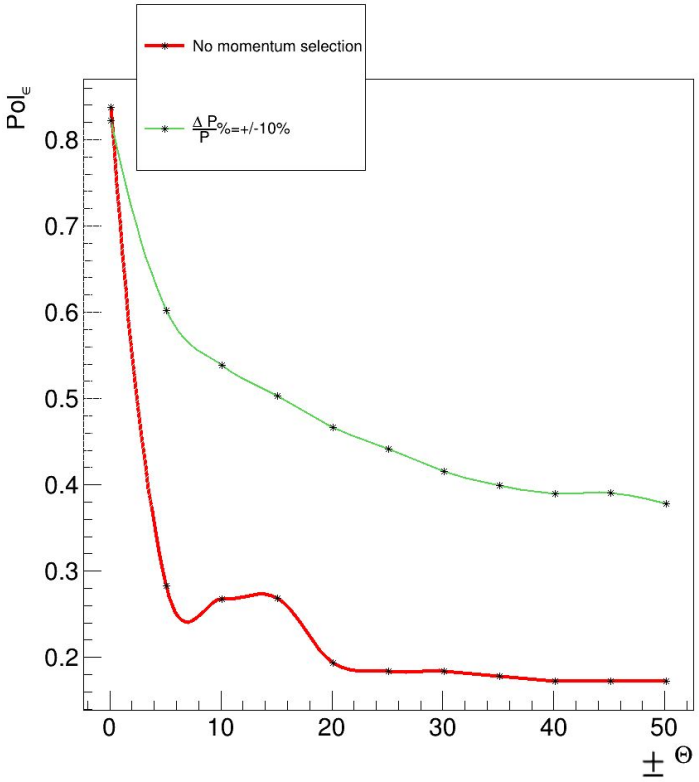


e+ momentum at FOM optimum

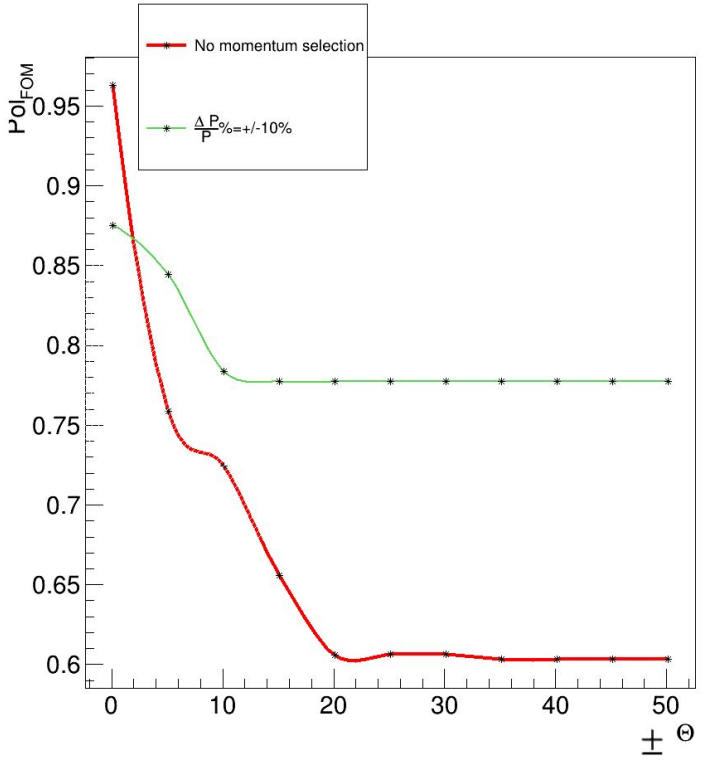


e^- At 120 MeV

e+ Polarization at efficiency optimum



e+ Polarization at FOM optimum



Target thickness

- Using momentum selection to increase FOM.
  - The angular cuts does influence the yield production.
    - The optimum target thickness increase with theta.
- The stairs shape is due to the less number of simulations.