Angular resolution with electrons (v1r030604p6) Vs beam incoming direction

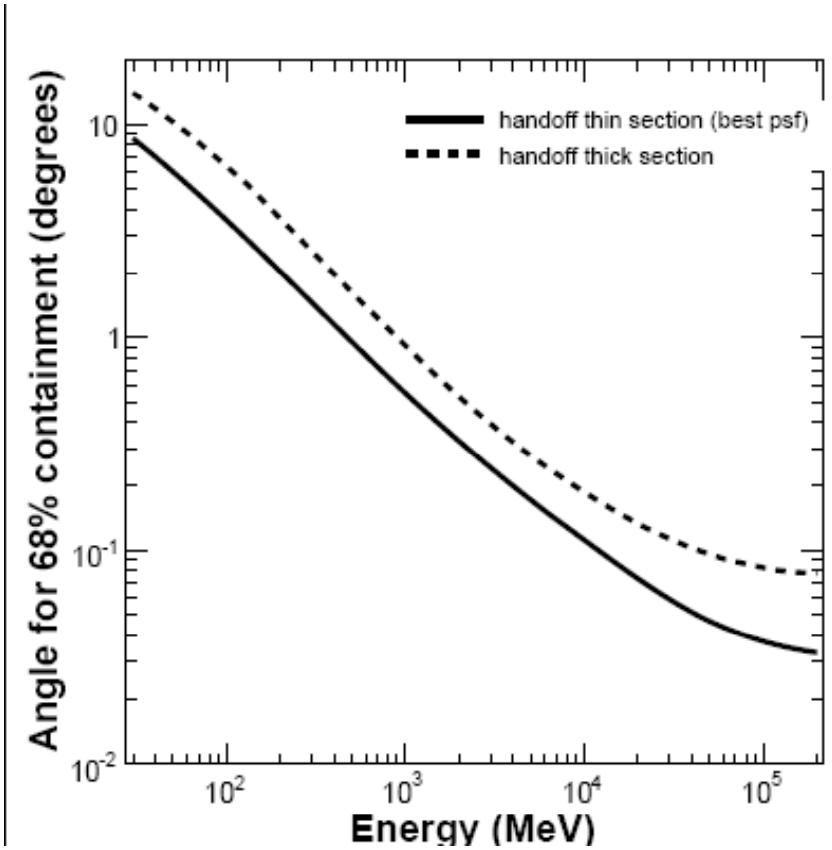
Nicola Mazziotta

Sep 19, 2007

mazziotta@ba.infn.it

Introduction

- **The angular resolution increases with the energy, i.e. it is less than 0.1° above 1 GeV.**
- **To evaluate the angular resolution with high energy electrons, the beam incoming direction must be well known, e.g. the beam direction cosine precision must be of order 10^{-6} or better (see David talk given on July 25th)**
- **A scanning procedure could be used to align the beam to the CU**



CU-Beam Alignment

The alignment is performed by a scanning procedure starting from the nominal incoming beam direction defined by the first track cosine directions.

$$(\varphi_{beam}^{nominal}, \vartheta_{beam}^{nominal})$$

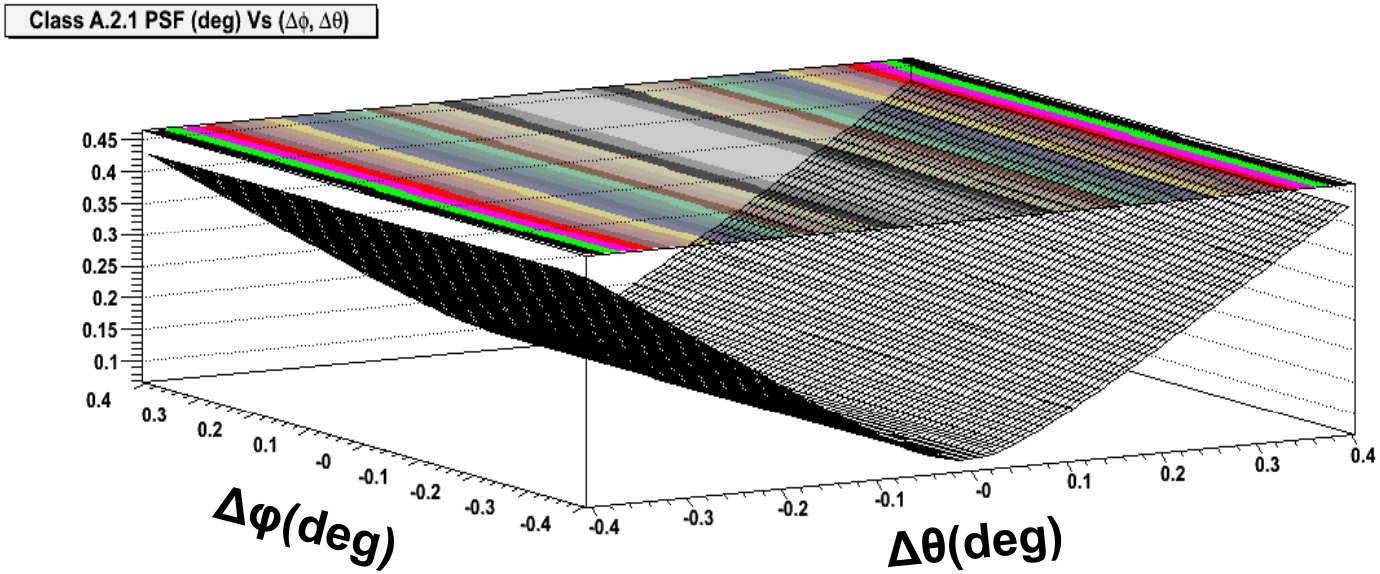
$$\Downarrow$$

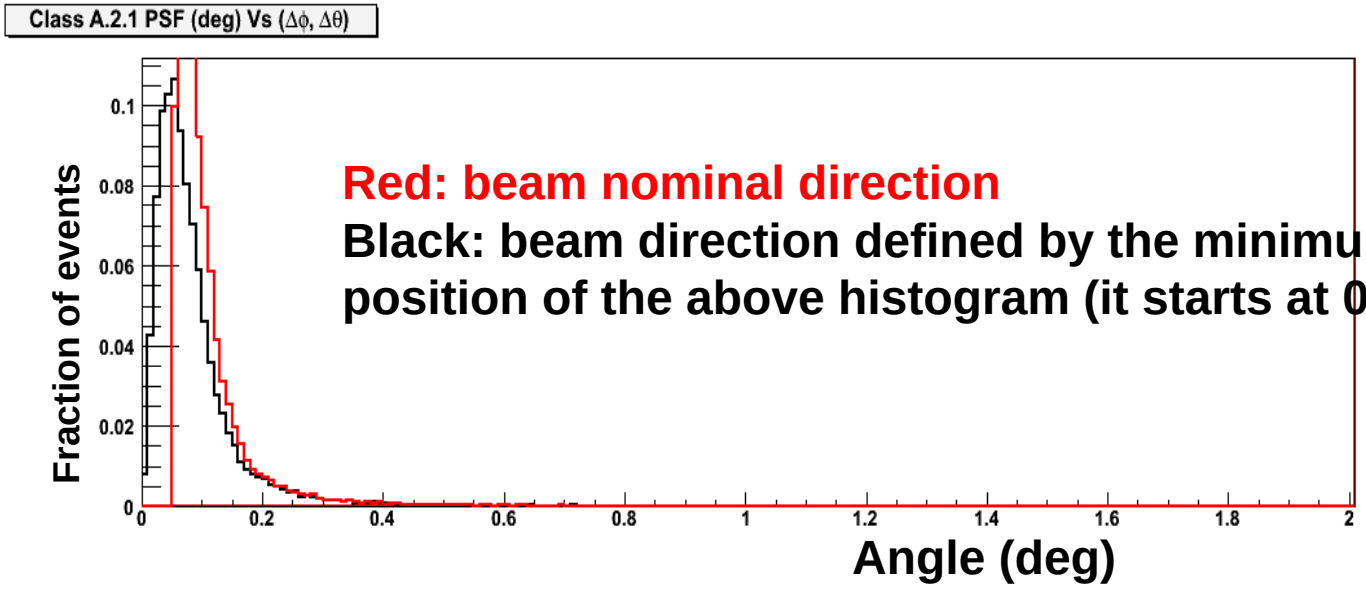
$$(\varphi_{beam}^{nominal} + \Delta\varphi, \vartheta_{beam}^{nominal} + \Delta\vartheta)$$

where $\Delta\varphi = \Delta\vartheta = -1^{o} + Nstep * 0.01^{0}$

Nstep = 0, 1, ….., 200

10 GeV – 0 deg

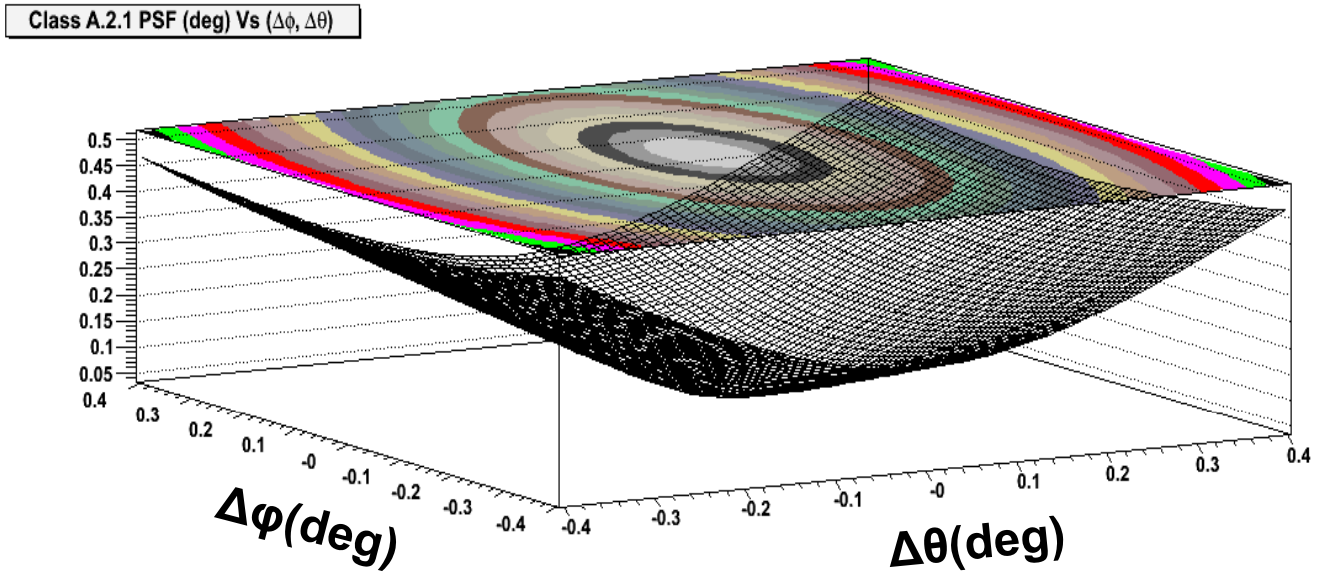


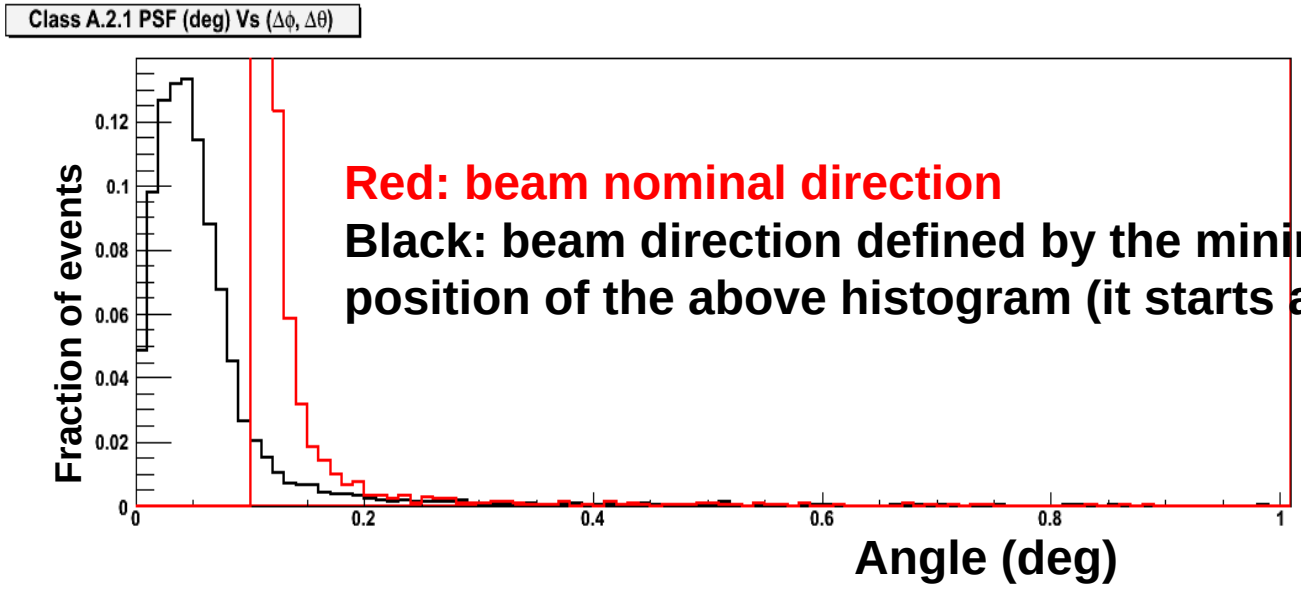


Red: beam nominal direction

Black: beam direction defined by the minimum position of the above histogram (it starts at 0 deg!)

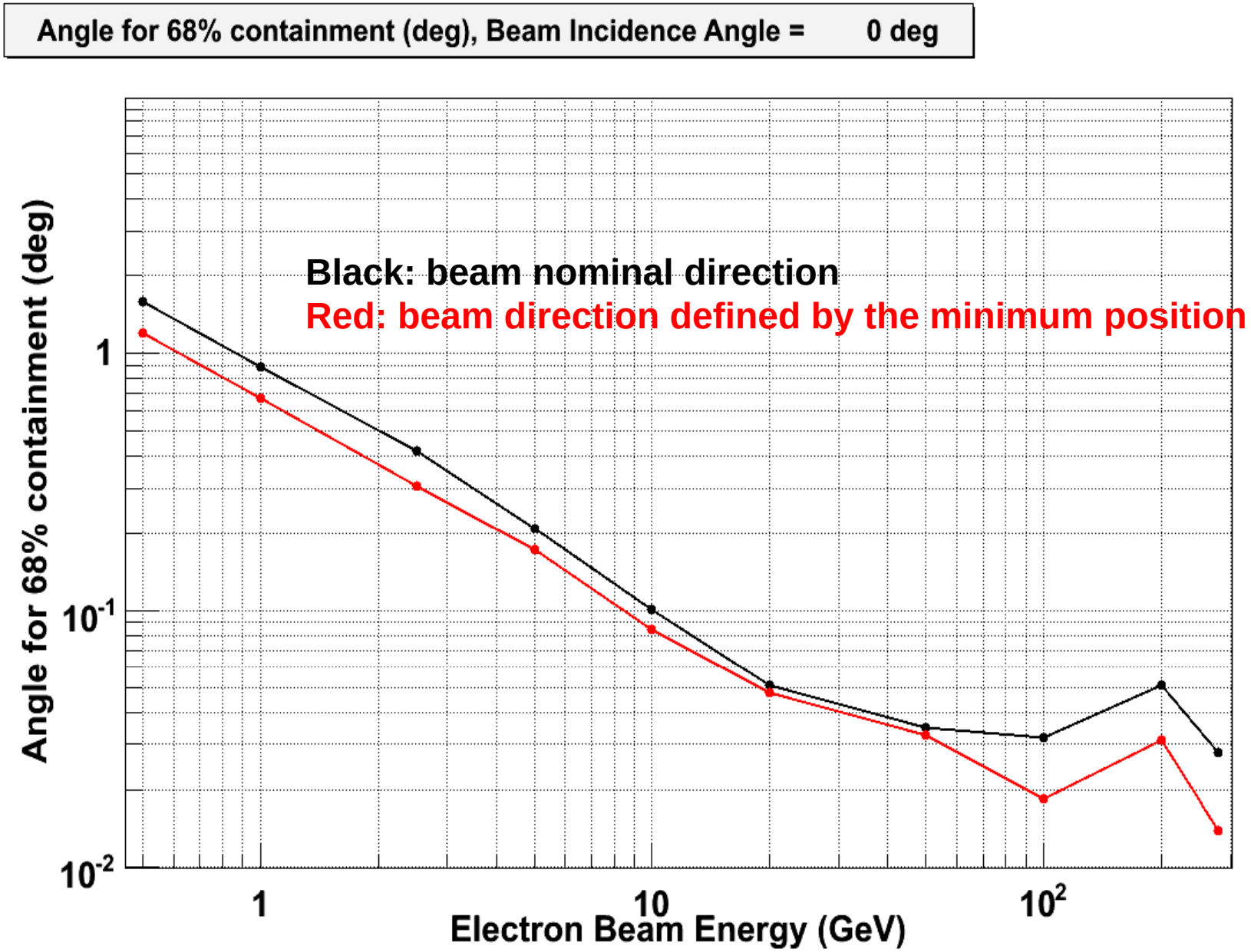
20 GeV – 30 deg

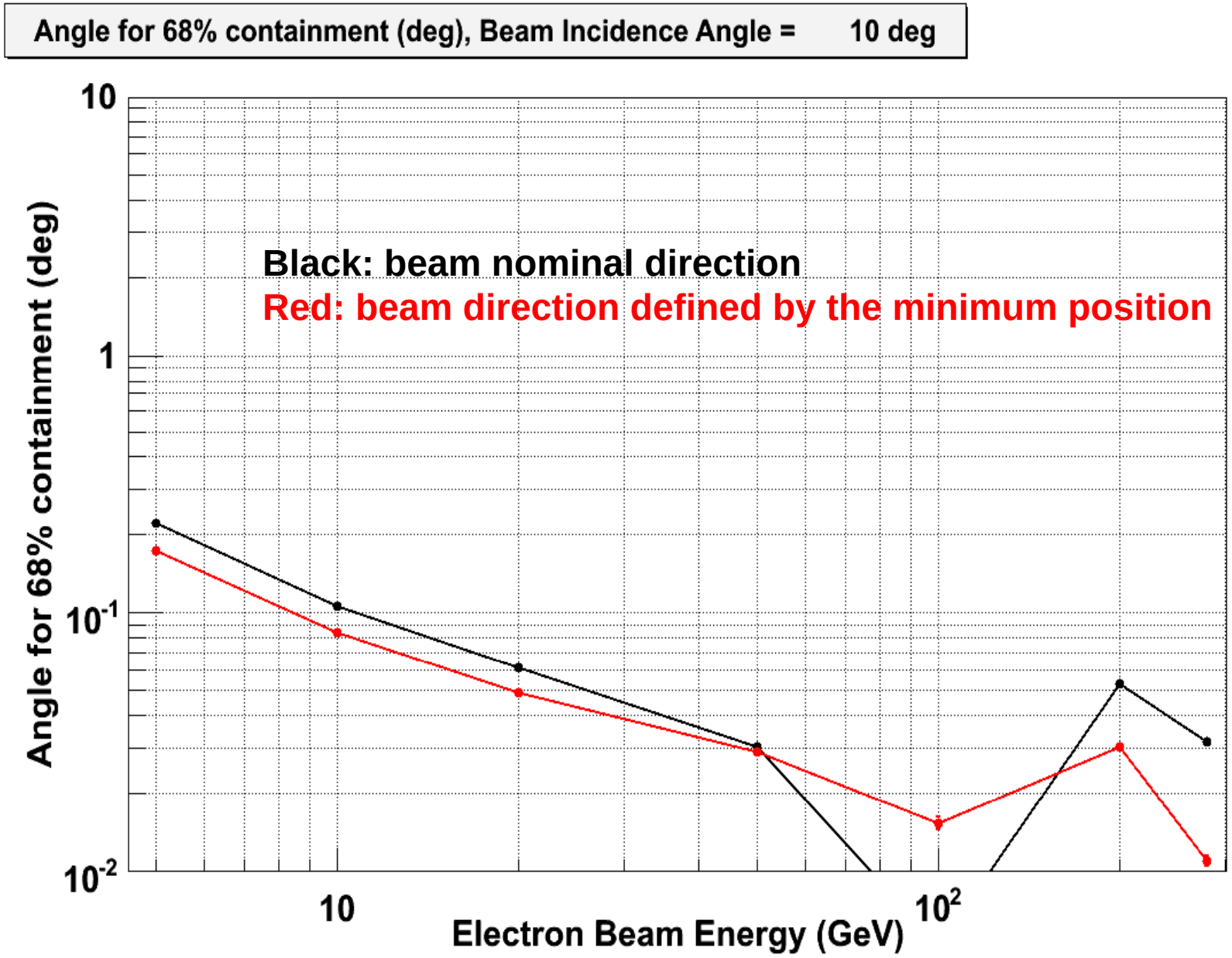


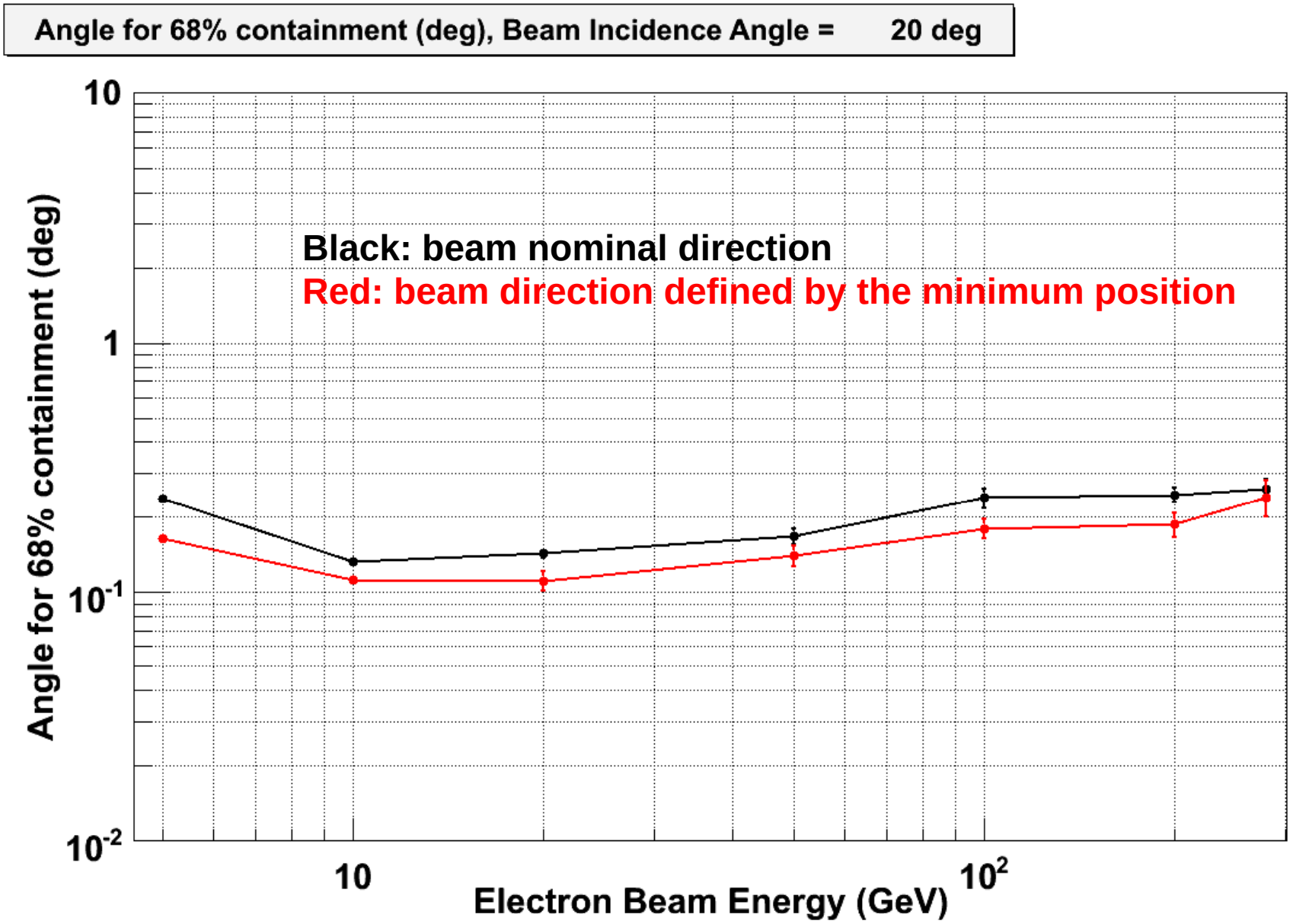


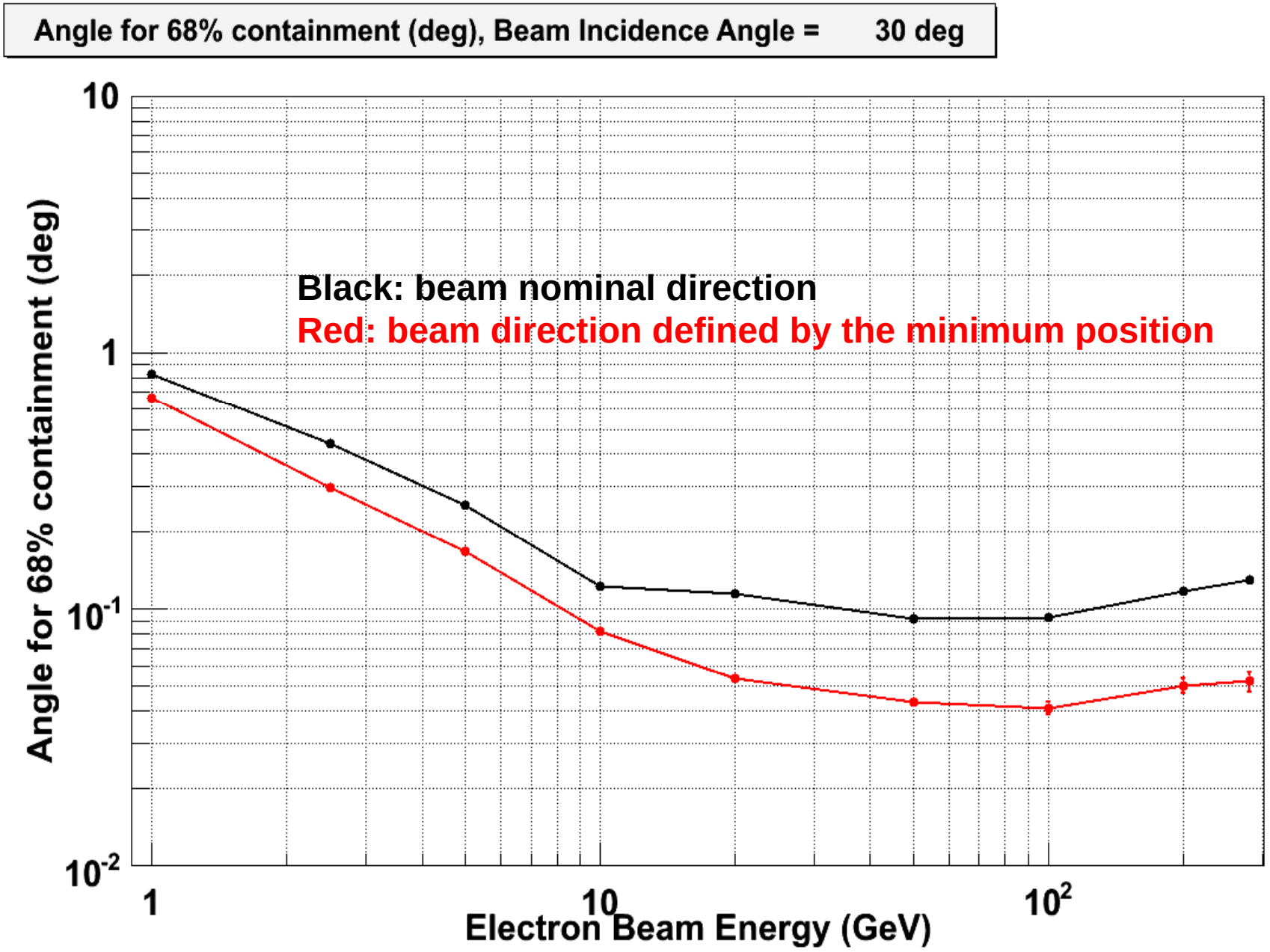
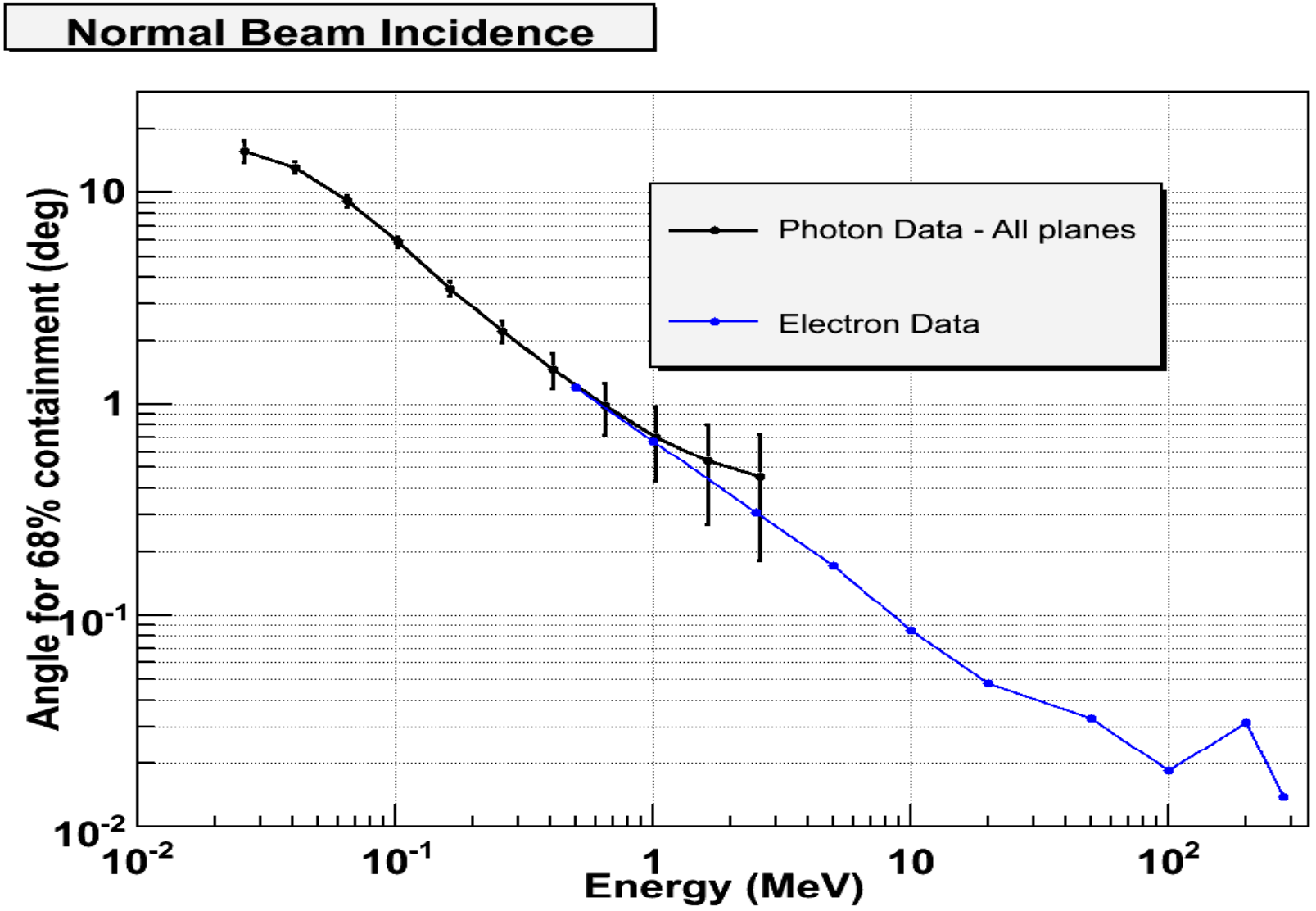
Red: beam nominal direction

Black: beam direction defined by the minimum position of the above histogram (it starts at 0 deg!)


Angle for 68% containment (deg), Beam Incidence Angle = 0 deg
Black: beam nominal direction
Red: beam direction defined by the minimum position
Angle for 68% containment (deg)
1
10^{-1}
10^{-2}
1
10
10^2
Electron Beam Energy (GeV)


Angle for 68% containment (deg), Beam Incidence Angle = 10 deg
Black: beam nominal direction
Red: beam direction defined by the minimum position
Angle for 68% containment (deg)
Electron Beam Energy (GeV)
10
1
10^-1
10^-2
10
10^2


Angle for 68% containment (deg), Beam Incidence Angle = 20 deg
Black: beam nominal direction
Red: beam direction defined by the minimum position
Angle for 68% containment (deg)
10
1
10^{-1}
10^{-2}
10
10^{2}
Electron Beam Energy (GeV)


Angle for 68% containment (deg), Beam Incidence Angle = 30 deg
Black: beam nominal direction
Red: beam direction defined by the minimum position
Angle for 68% containment (deg)
Electron Beam Energy (GeV)
10
1
10^{-1}
10^{-2}
1
10
10^2

Photon + Electron Data