First Look at the SYNRAD3D with Diffuse Scattering at 15W

-- Comparison with previous simple vacuum chamber wall model (9x5 cm elliptical) --

-- Comparison of simple wall calculation with detailed wall model including diffuse scattering--

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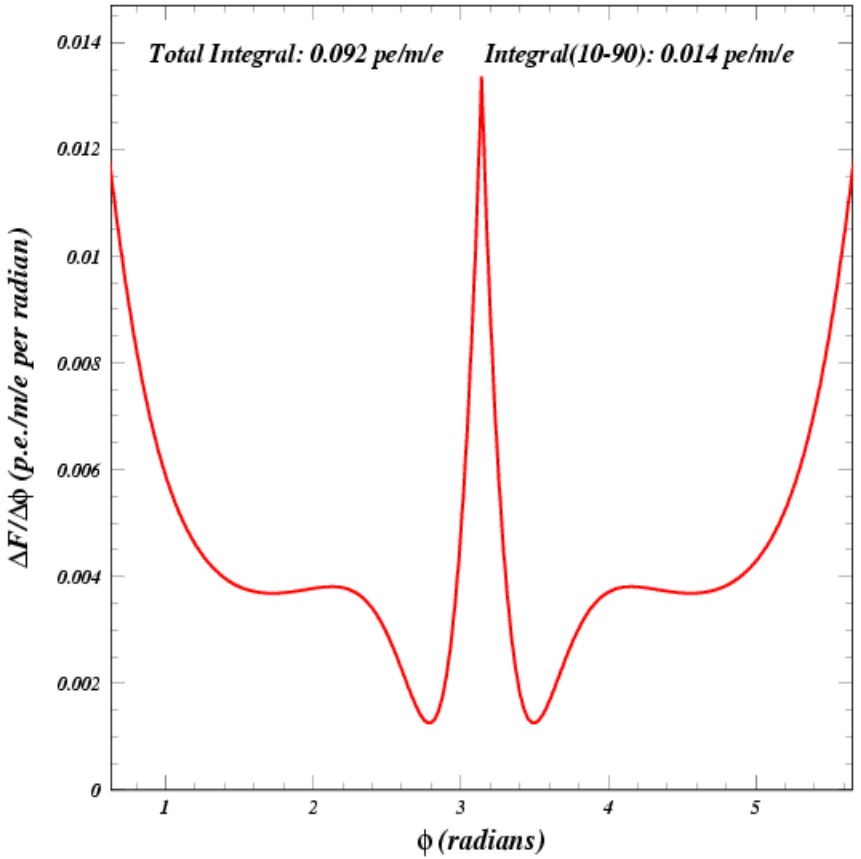
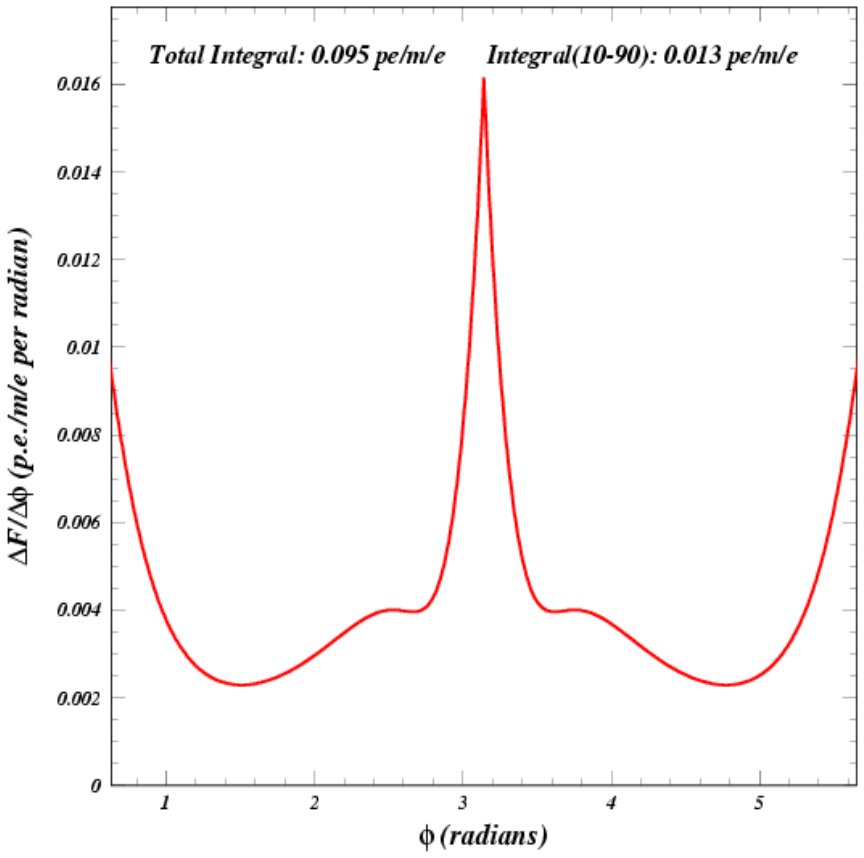
Reminder of slide 3 on 13 July 2011
5.3 GeV e+, 15W Shielded Pickup

Old SYNRAD3d with smooth wall file

Assuming QE = 10%

New SYNRAD3d with smooth wall file

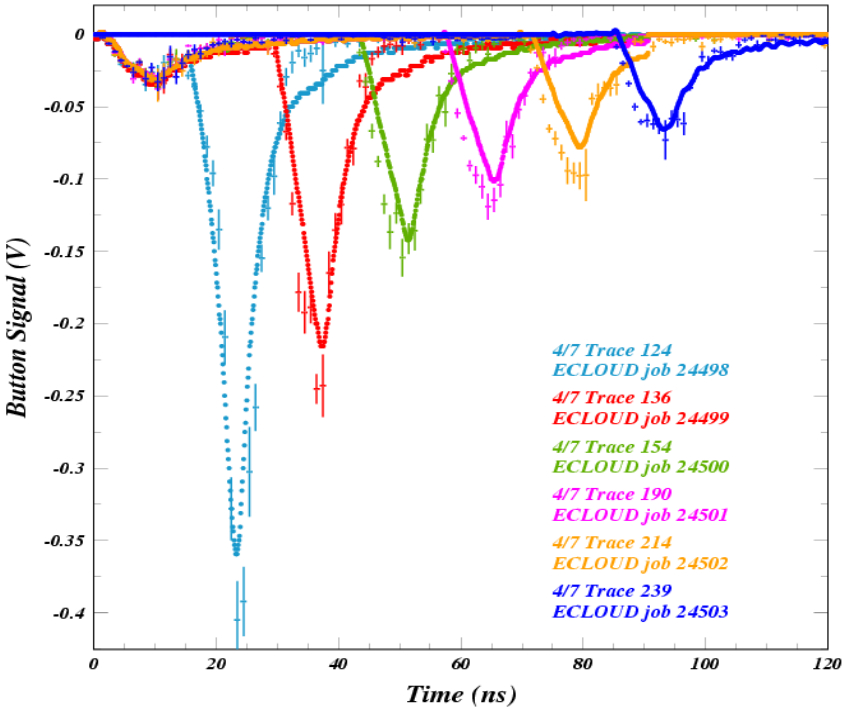




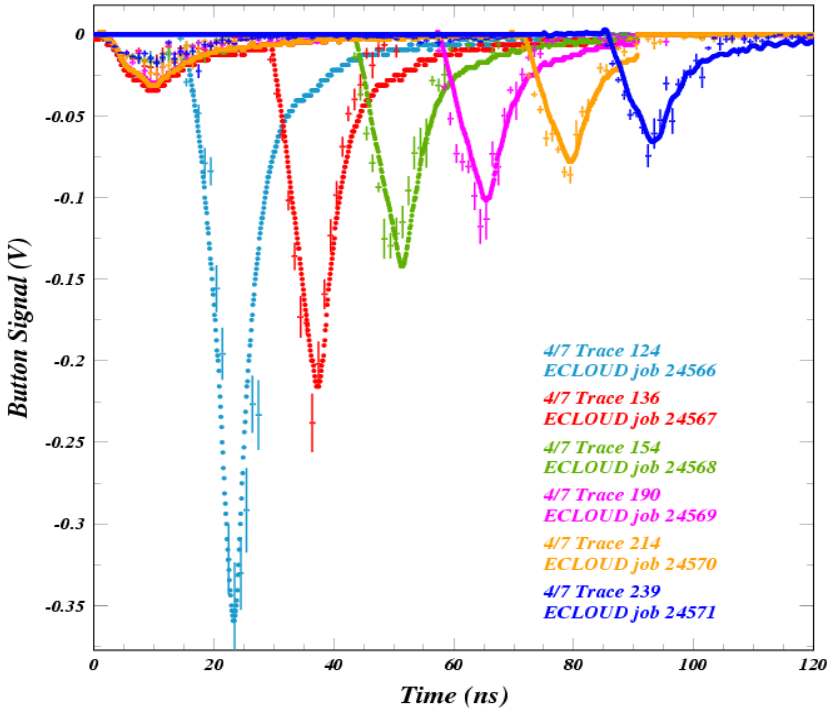
While the total reflectivity has changed little, the azimuthal distribution of absorbed photons is quite different. This will have significant consequences for the ECLOUD simulation of the SPU signal. How has SYNRAD3D changed?

Reminder of slide 4 on 13 July 2011
5.3 GeV e+, 5 mA/bunch, 15W (TiN) Shielded Pickup

Old SYNRAD3d with smooth wall file



New SYNRAD3d with smooth wall file

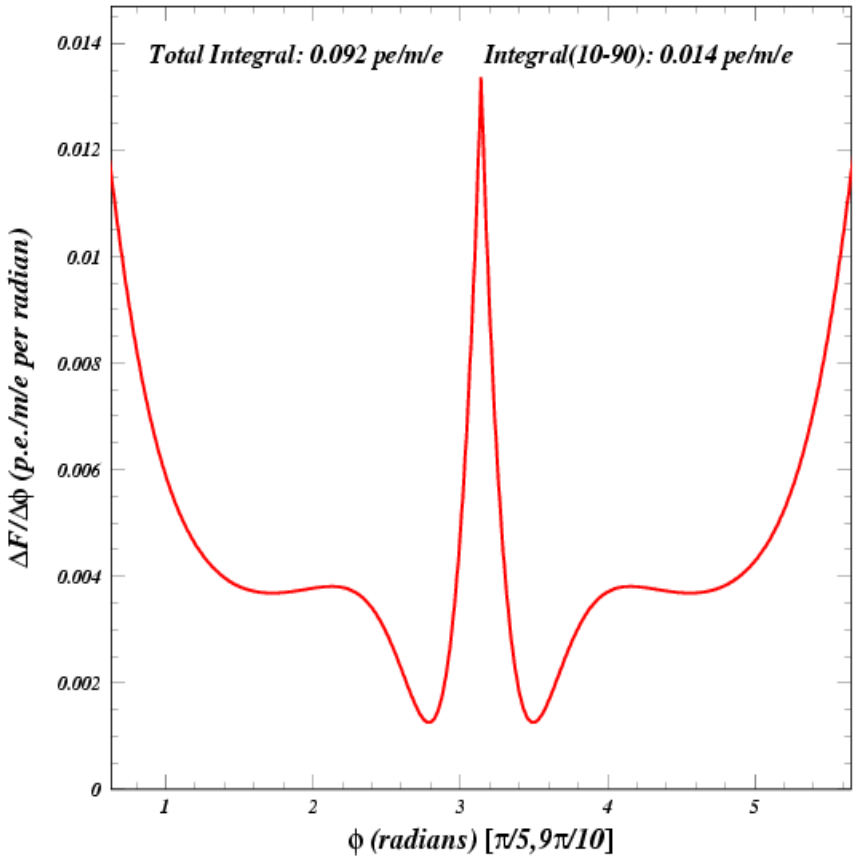


Comparing witness bunch simulations without tuning the ECLOUD input parameters

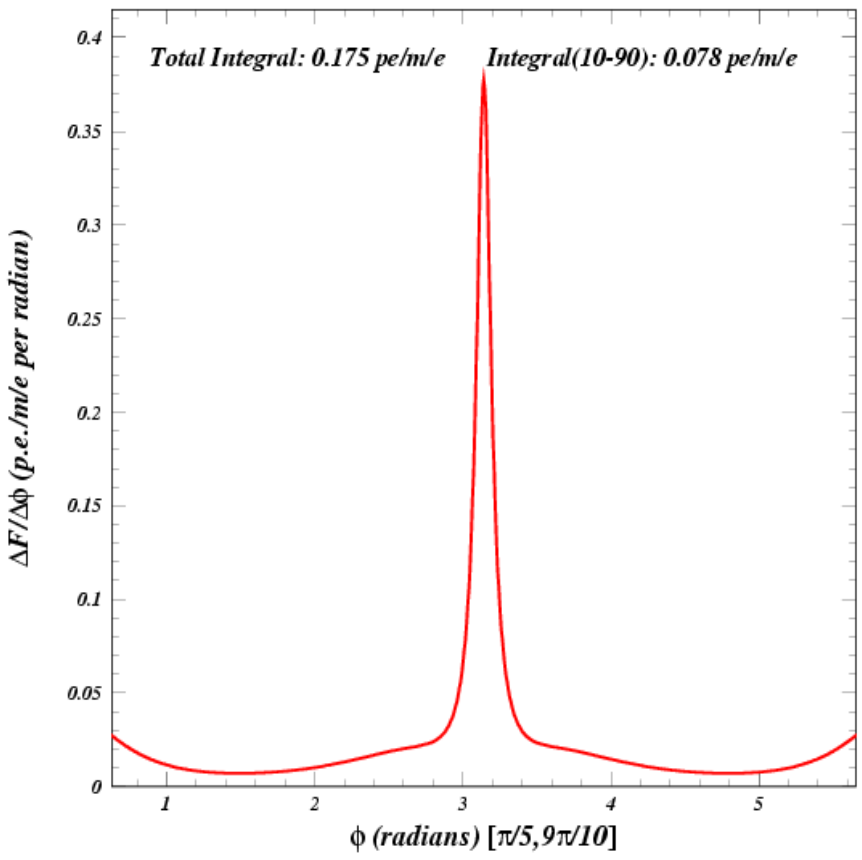
The witness bunch simulations have been much improved by introducing more flexible photoelectron energy distributions and tuning other input parameters such as the secondary energy distribution. In particular, the introduction of independent p.e. energy distributions and quantum efficiencies for direct and reflected photons will serve to adapt to the new SYNRAD3D calculations. The above comparison points to increasing the quantum efficiency for reflected photons.

Compare old SYNRAD3D with new including diffuse scattering
5.3 GeV e+, 15W Shielded Pickup

Old SYNRAD3d with smooth wall file



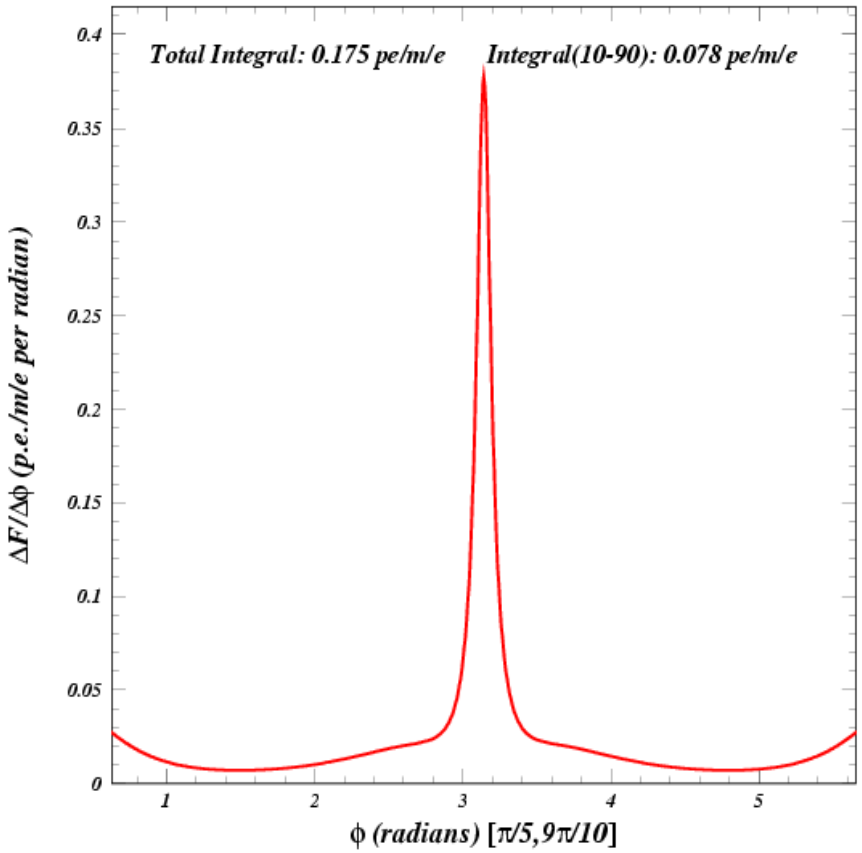
SYNRAD3d including diffuse scattering with smooth wall file



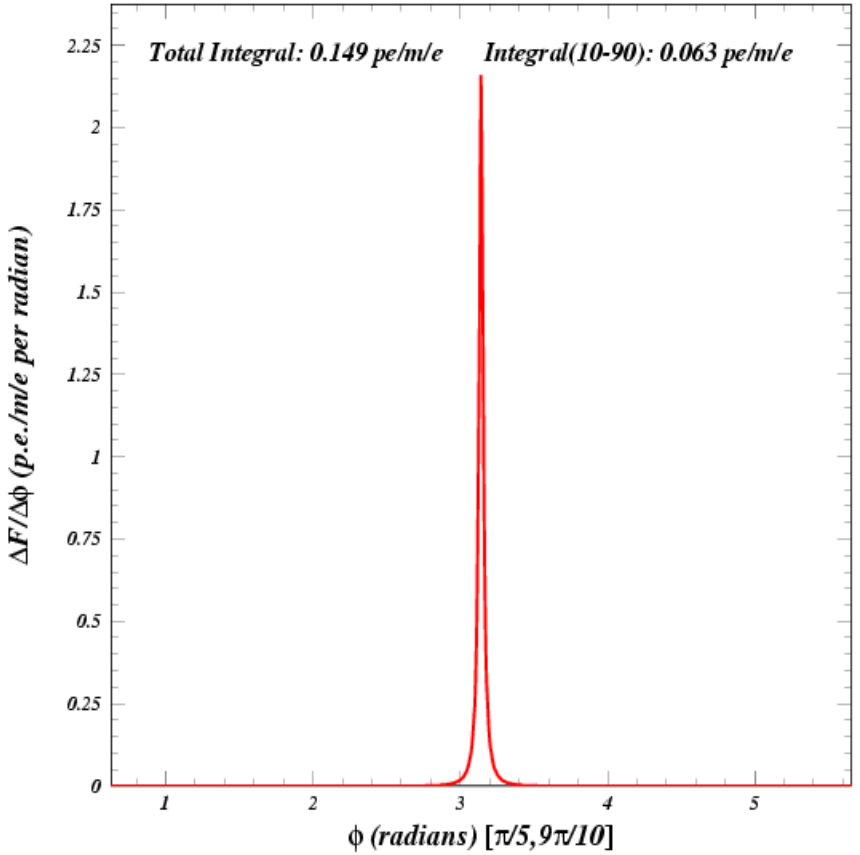
The overall photon rate has almost doubled.
The distributions on the sides of the vacuum chamber are narrower.

Compare smooth and realistic wall files including diffuse scattering
5.3 GeV e+, 15W Shielded Pickup

SYNRAD3d including diffuse scattering with smooth wall file



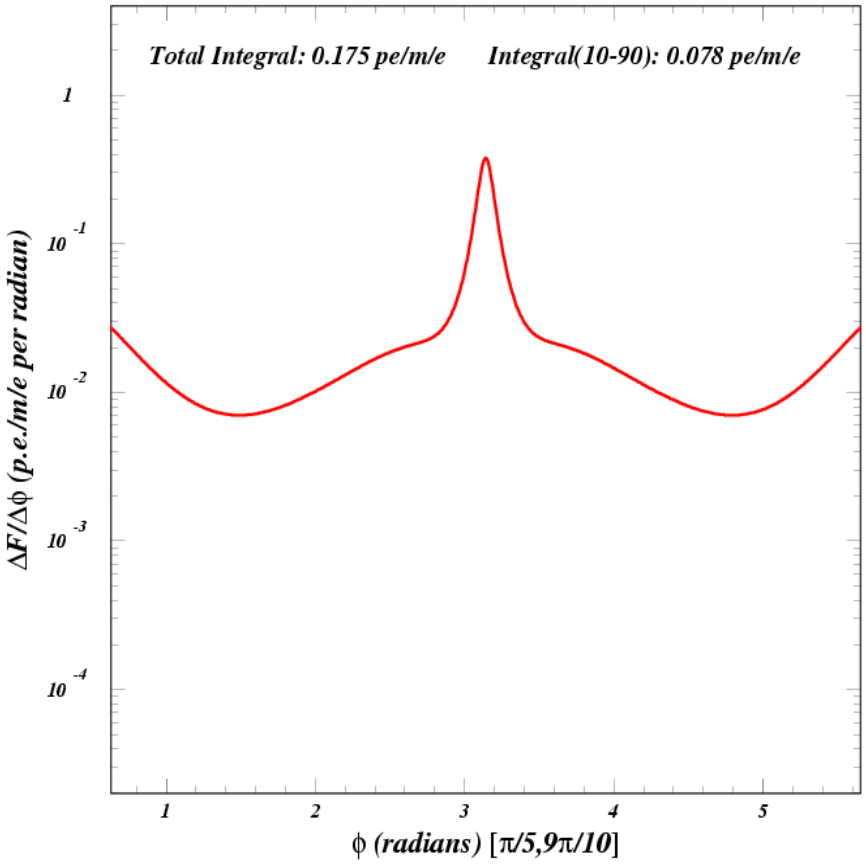
SYNRAD3d including diffuse scattering with realistic wall file



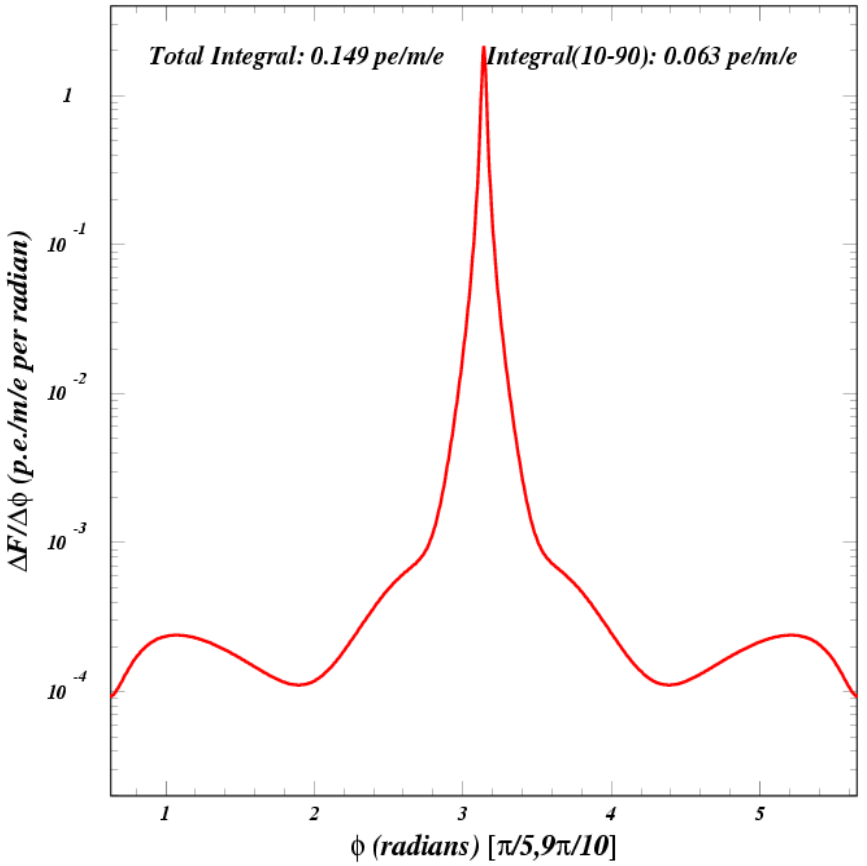
The distributions on the sides of the vacuum chamber are extremely narrow.

Compare smooth and realistic wall files including diffuse scattering
5.3 GeV e+, 15W Shielded Pickup

SYNRAD3d including diffuse scattering with smooth wall file



SYNRAD3d including diffuse scattering with realistic wall file



Log scale comparison of smooth and realistic wall profiles with diffuse scattering.
ECLOUD simulations to date have been done for p.e. rates on the bottom of the beampipe of about 0.004 pe/m/e.