# *First Look at the New SYNRAD3D Results*

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

***-- Comparison of new simple wall calculation with new detailed wall model --***

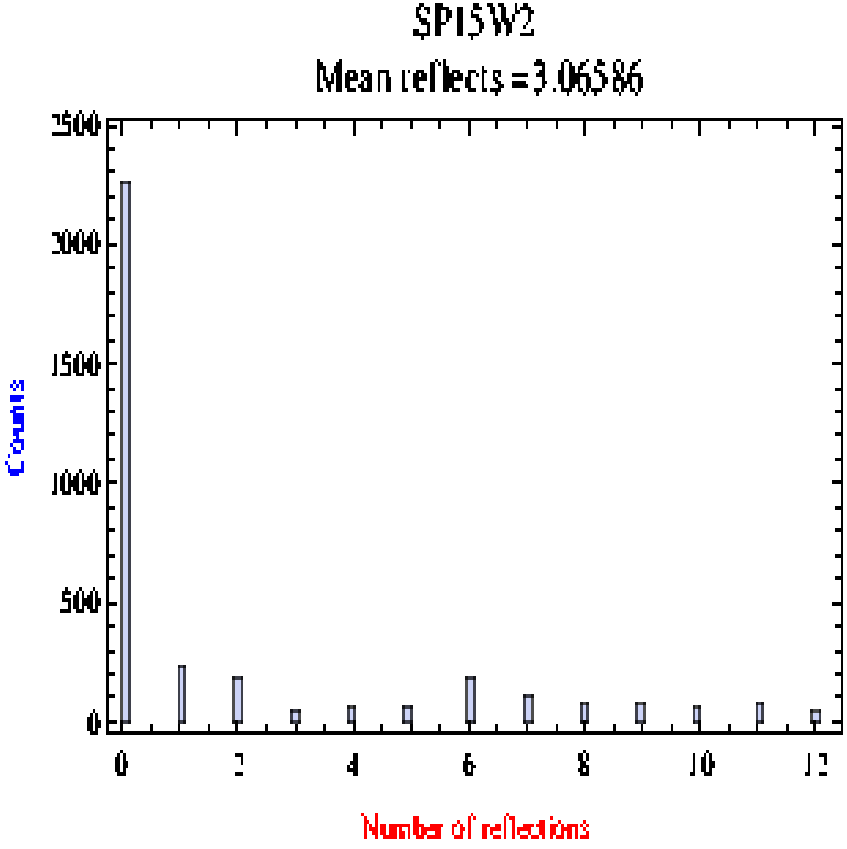
***Lots of work by Takuya Ishibashi, Gerry Dugan, David Sagan and Sergey Milashuk***

Jim Crittenden
*Cornell Laboratory for Accelerator-Based Sciences and Education*
*Electron Cloud Meeting*
*15 June 2011*

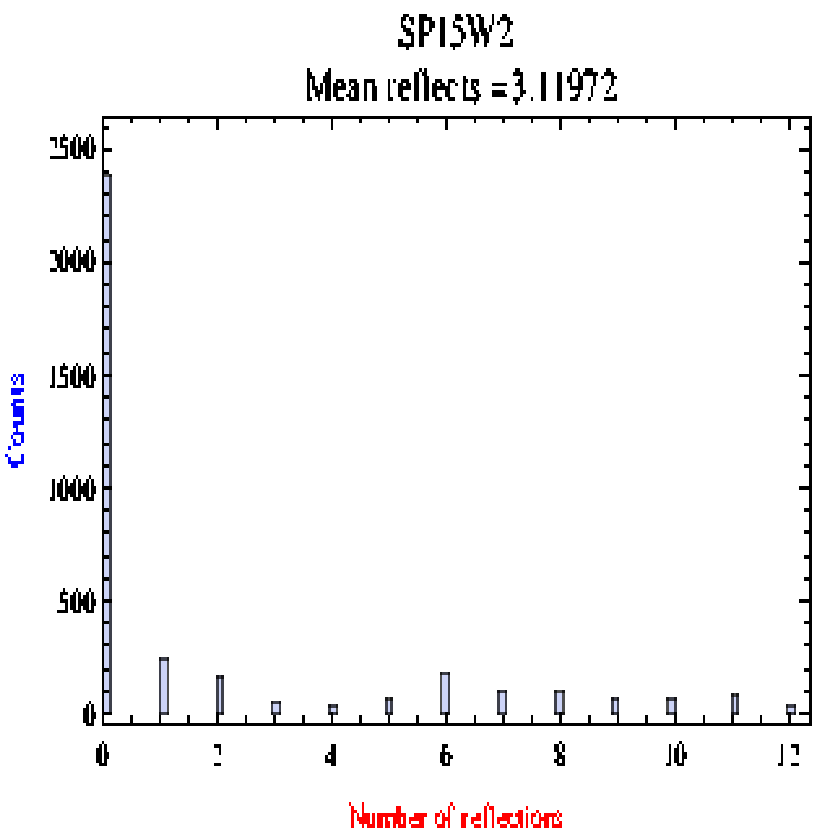
# Compare old and new with smooth wall file

## 5.3 GeV e+, 15W (TiN) Shielded Pickup

### Old SYNRAD3d with smooth wall file



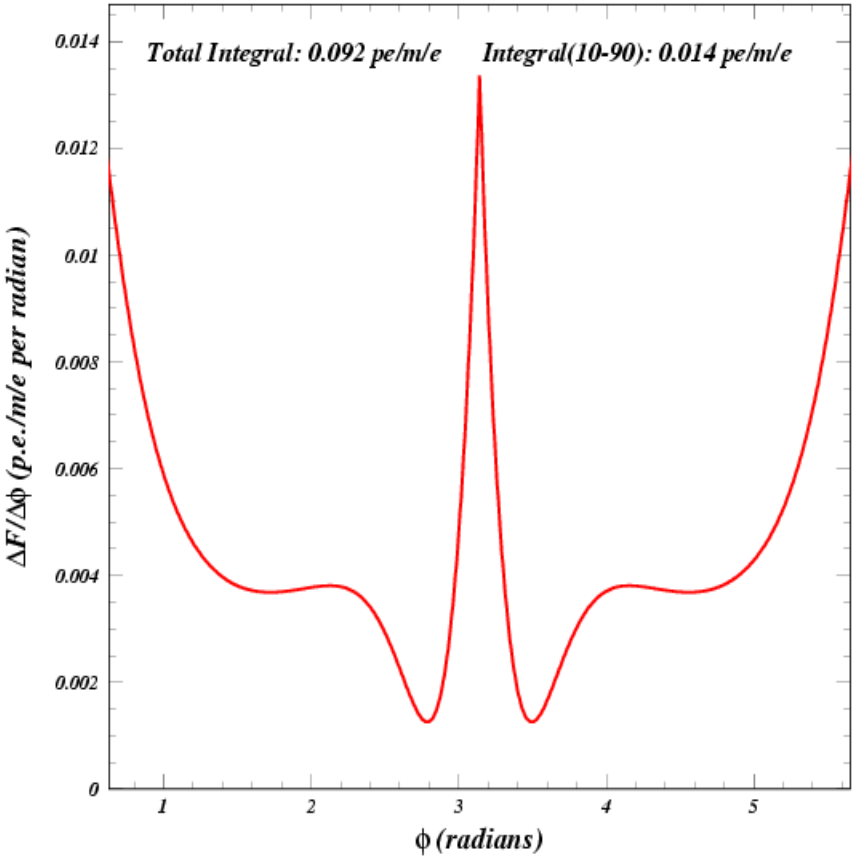

### New SYNRAD3d with smooth wall file



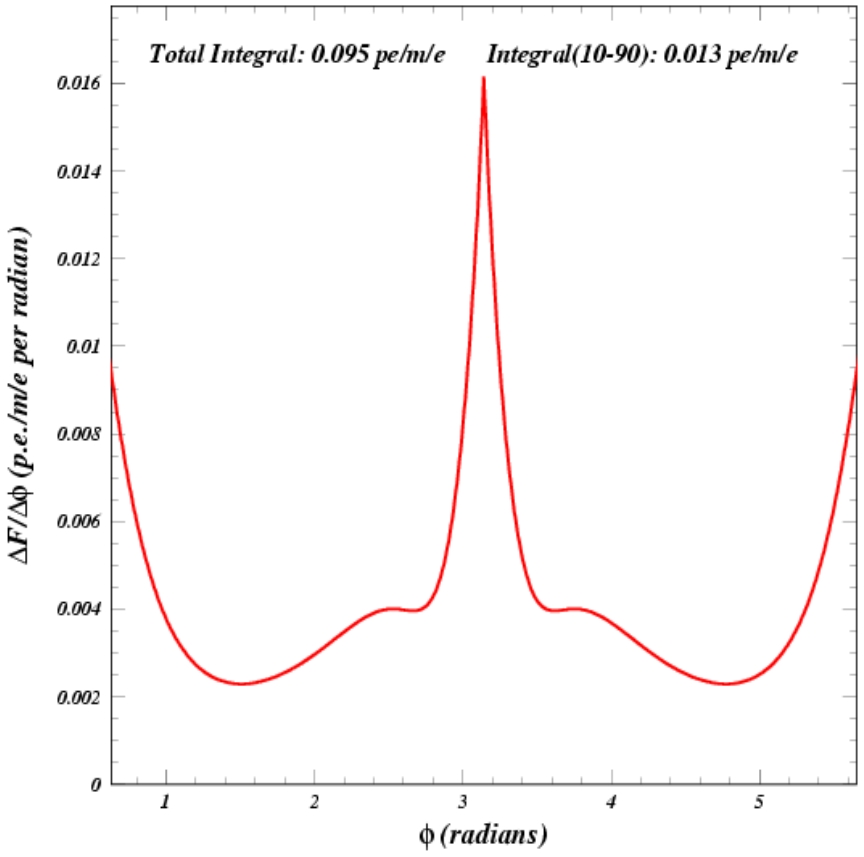

*Similar results for the number of reflections prior to absorption.*

# Compare old and new with smooth wall file
## 5.3 GeV e+, 15W (TiN) Shielded Pickup

### Old SYNRAD3d with smooth wall file



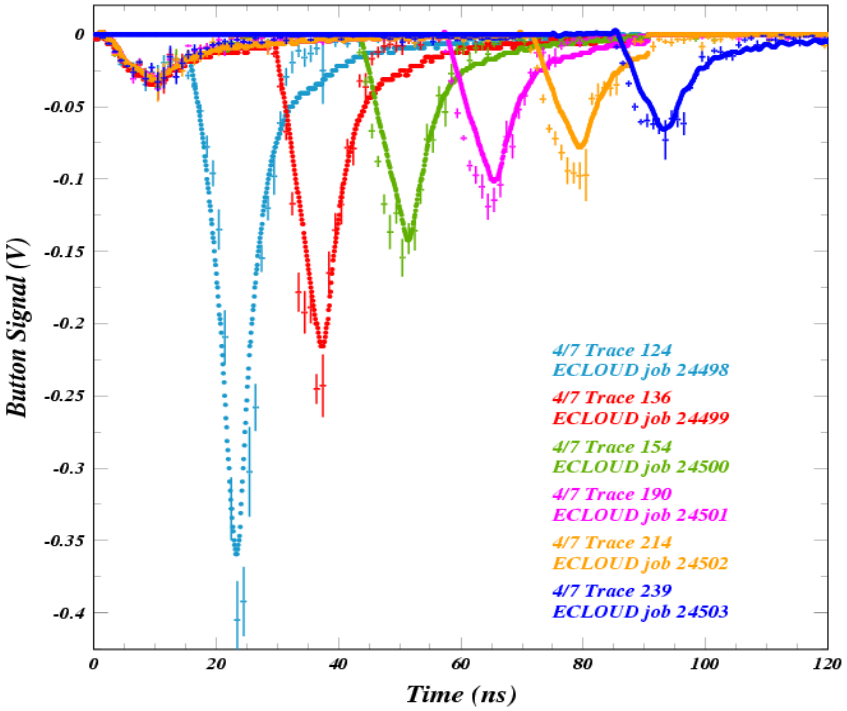

### New SYNRAD3d with smooth wall file



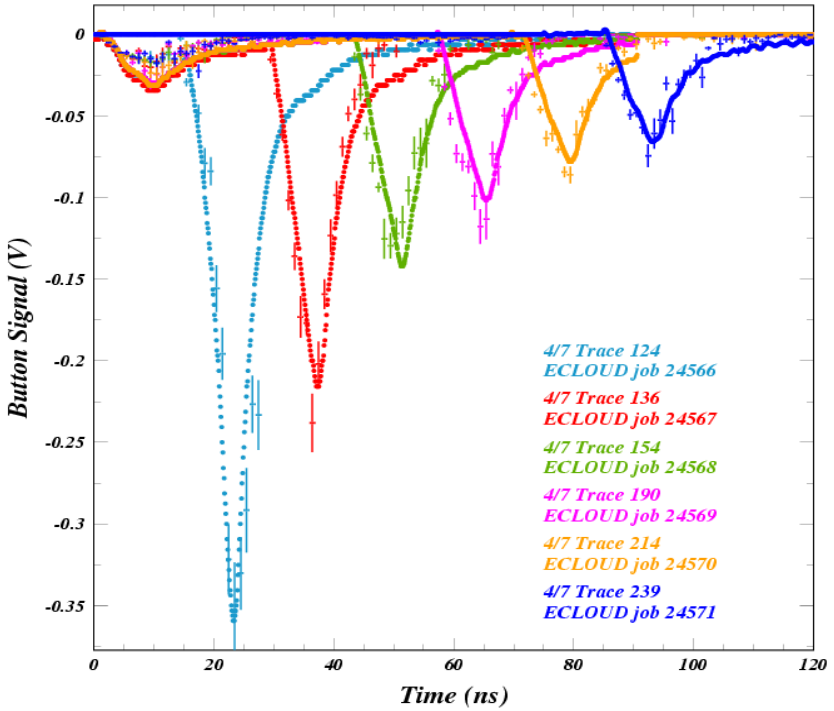

**While the total reflectivity has changed little, the azimuthal distribution of absorbed photons is quite different. This will have significant consequences for the ECLOUD simulation of the SPU signal. How has SYNRAD3D changed?**

# Compare old and new with smooth wall file
## 5.3 GeV e+, 5 mA/bunch, 15W (TiN) Shielded Pickup

### Old SYNRAD3d with smooth wall file




### New SYNRAD3d with smooth wall file



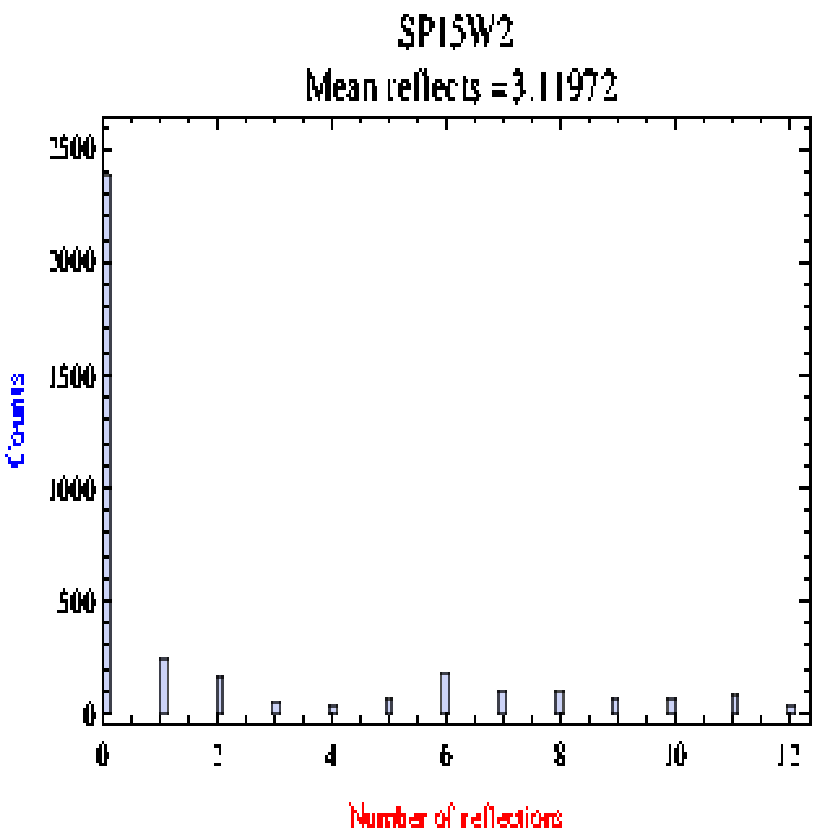

## Comparing witness bunch simulations without tuning the ECLOUD input parameters

*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.*

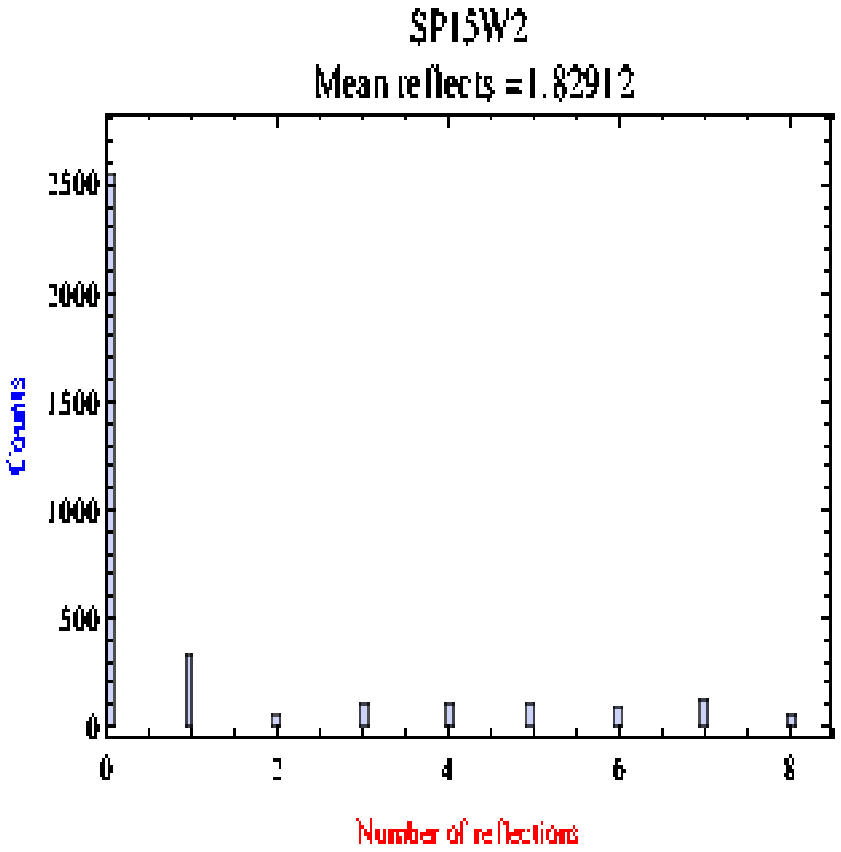
# Compare new smooth and realistic wall files

## 5.3 GeV e+, 15W Shielded Pickup

### New SYNRAD3d with smooth wall file



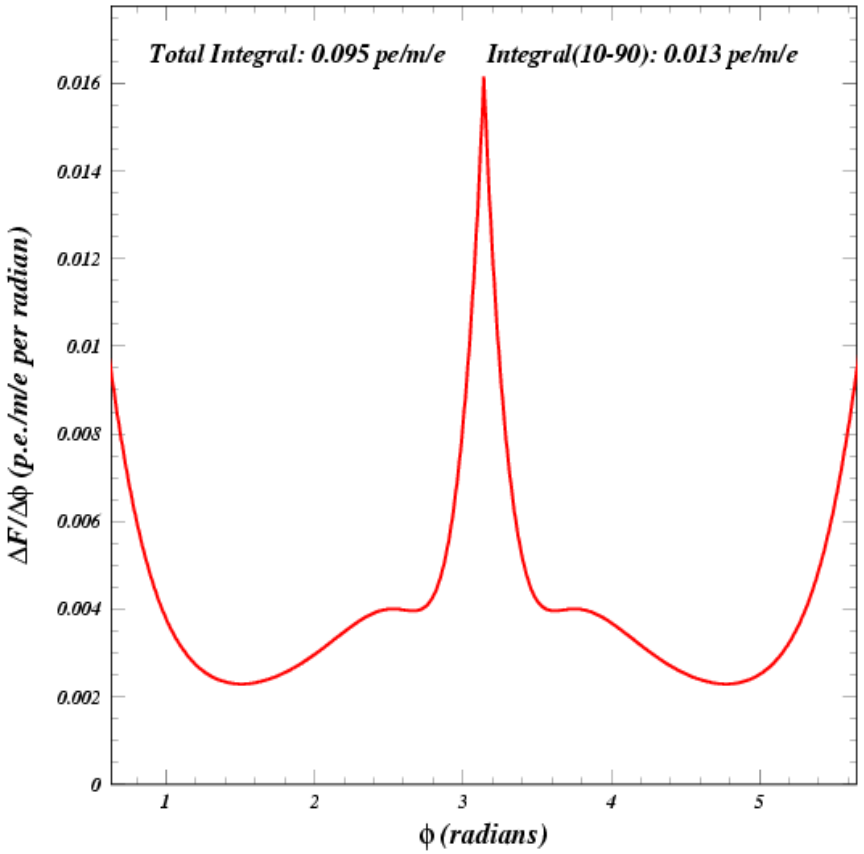

### New SYNRAD3d with realistic wall file



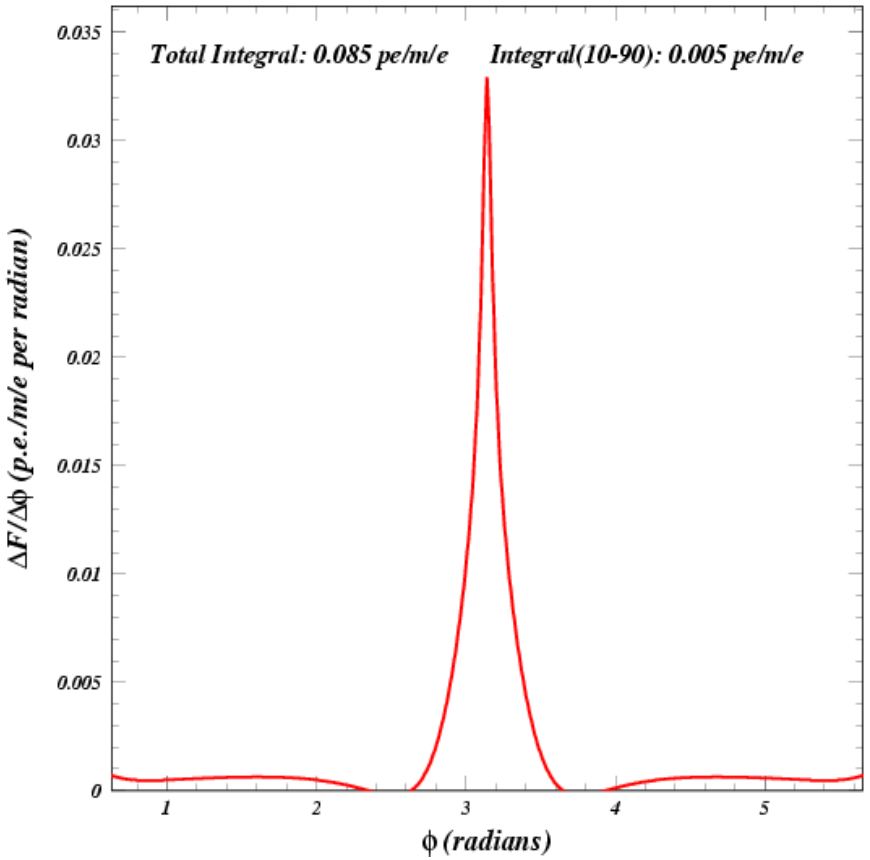

**Significantly fewer reflections with the realistic wall file.**

# Compare old and new with smooth wall file
## 5.3 GeV e+, 15W (TiN) Shielded Pickup

### New SYNRAD3d with smooth wall file



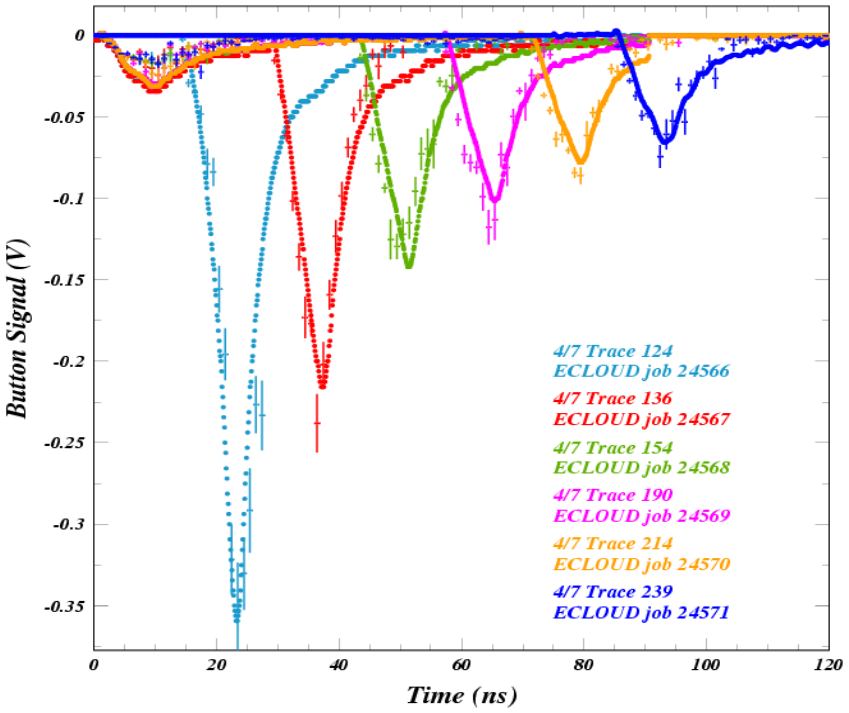

### New SYNRAD3d with realistic wall file



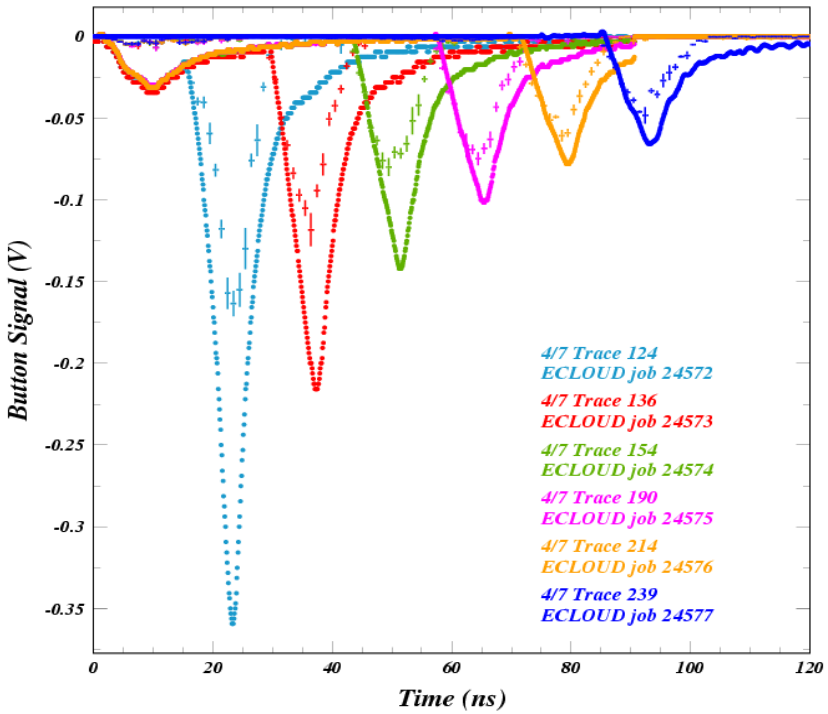

**The new realistic wall file predicts dramatically less (factor < 0.5) reflected photoelectrons from scattered photons and that they will come primarily from the inside wall of the beampipe. The SPU measurements can be expected to provide stringent tests of these predictions.**

# Compare old and new with smooth wall file
## 5.3 GeV e+, 5 mA/bunch, 15W (TiN) Shielded Pickup

### New SYNRAD3d with smooth wall file




### New SYNRAD3d with realistic wall file




***The SYNRAD3D calculation using the detailed wall file indicates almost no SPU signal from the bottom of the beampipe. Since we do see such a signal, we need to investigate the SYNRAD3D calculation in detail to understand the origin and credibility of its prediction.***