Cornell University
Laboratory for Elementary-Particle Physics

Progress on Determining the Photoelectron Energy Distribution Using the B_{sol}=0 Shielded Button Data

All material for this talk may be obtained at www.lepp.cornell.edu/~critten/cesrta/ecloud/14jul10

The measurements are described here: https ://webdb.lepp.cornell.edu/elog/CTA+MS/528

See also previous talks on simulations for the shielded button data on 4/21, 4/28, 5/12, 7/7/2010

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Cornell Laboratory for Accelerator-Based Sciences and Education

Electron Cloud Meeting

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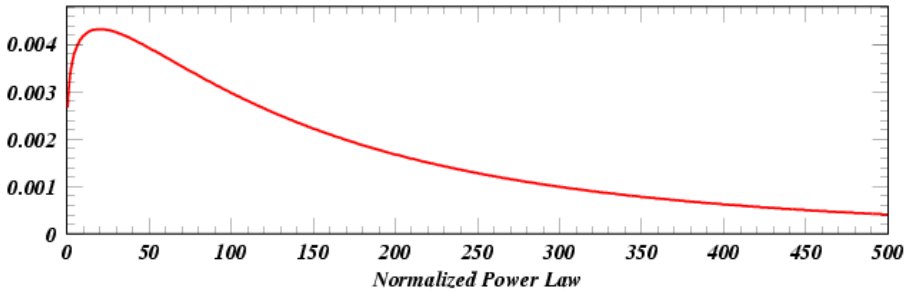
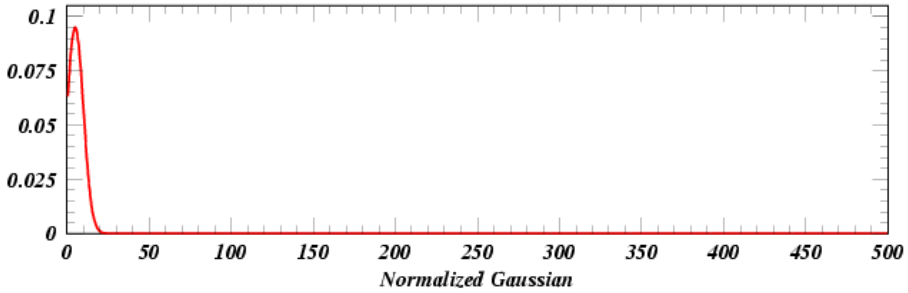
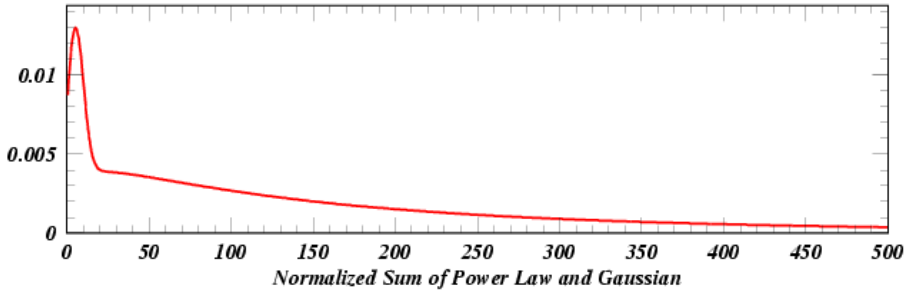
Hybrid Power-Law/Gaussian Distribution Implemented in ECLOUD





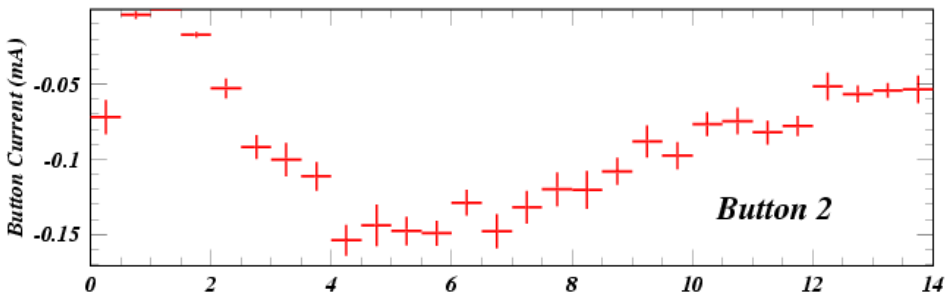


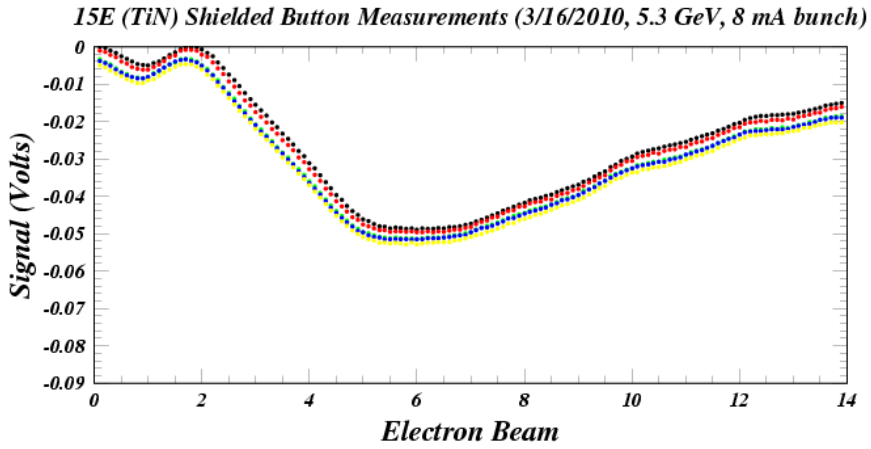
Power-law parametrization: $F(E) = E^{P1} / (1 + E/E_0)^{P2}$

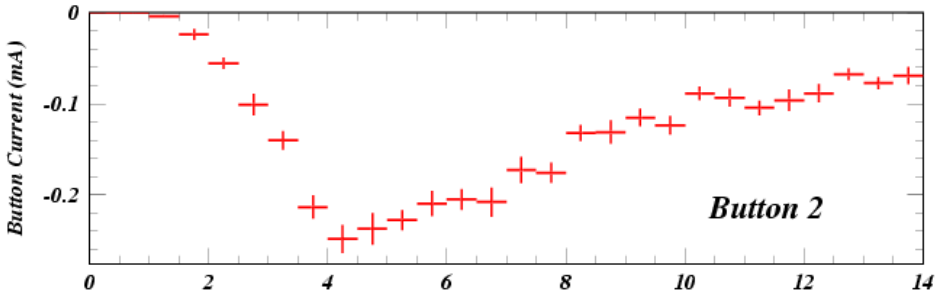
Example shown is for 10% Gaussian with peak and rms values of 5 eV.

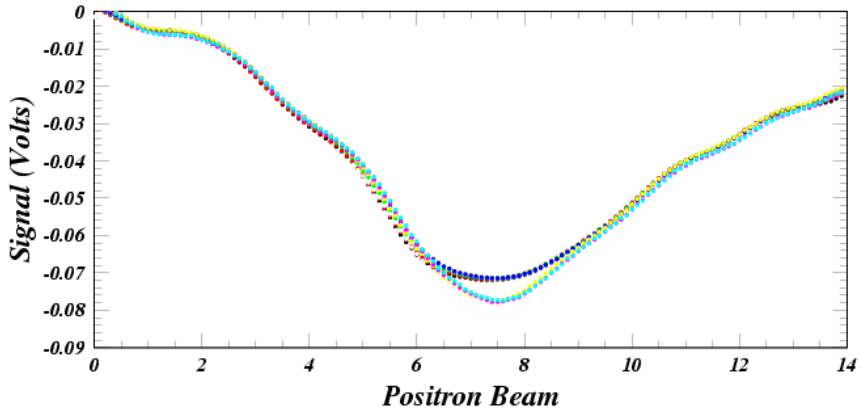
If this is what we need, the power law alone will not work.

Present Status:
Reasonable agreement and realistic cloud model







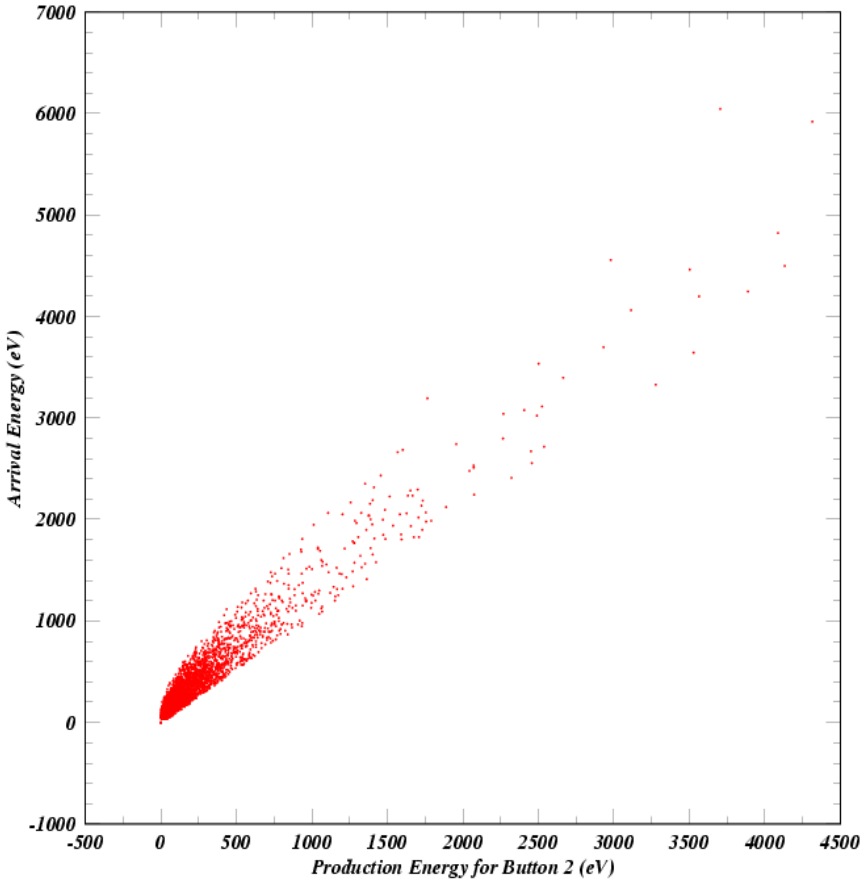


The prompt signal for the electrons will be smeared and delayed by the not-yet-modelled secondary yield in the v.c. port holes. The ratio of the e+ and e- signals depends on the photon rate and reflectivity. Here we use 1.0 photon/m/s for both, and reflectivity values of 20% (e+) and 100% (e-).

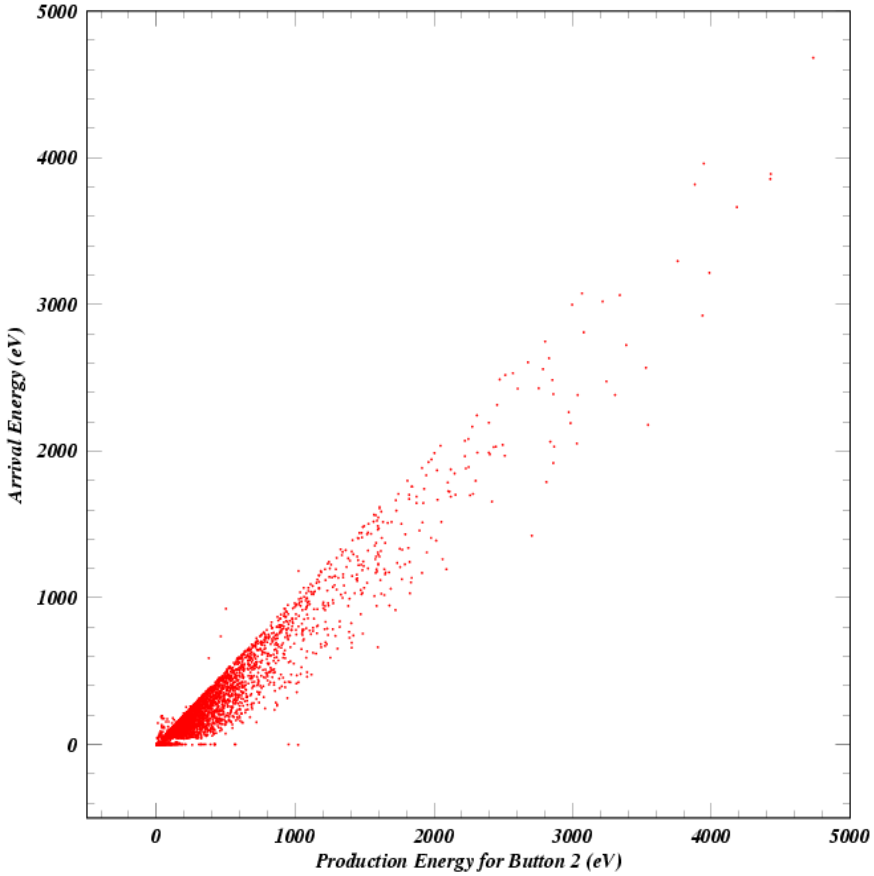
Work on the signal shape for positrons is ongoing. We have a parametrization that works well, but need to reconcile it with the electron beam data. In general, the contribution to the positron signal is from low-energy photoelectrons which do not contribute to the electron signal.

Relationship between arrival and production energies for photoelectrons contributing to the shielded button signal

Positron Beam



Electron Beam



The kinematics of the macroparticles contributing to the rising edge of the signal is very different in the two cases.
The signal for the electron beam is very sensitive to the shape of the high-energy range of the photoelectron energy distribution.
The signal for the positron beam is more sensitive to the low-energy range.