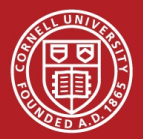


Cornell University
Laboratory for Elementary-Particle Physics

Using Time-Resolved Retarding Field Analyzer Measurements to Determine the SEY Mitigation Effectiveness of Grooves

-- Bonus: first look at last night's data --

Jim Crittenden

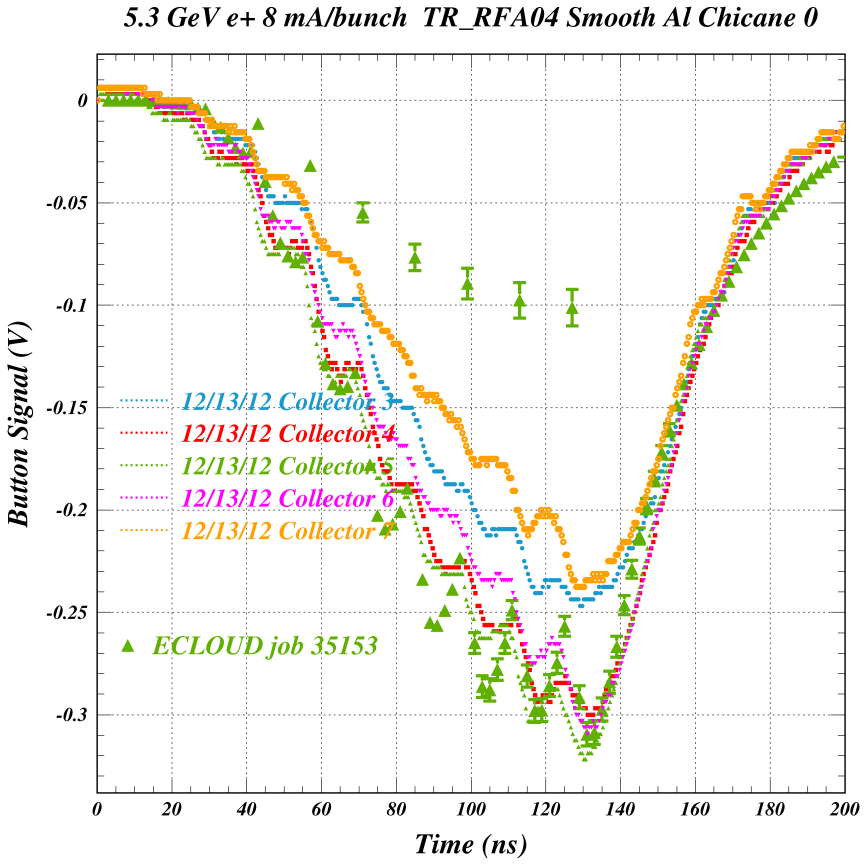
Cornell Laboratory for Accelerator-Based Sciences and Education

Electron Cloud Meeting

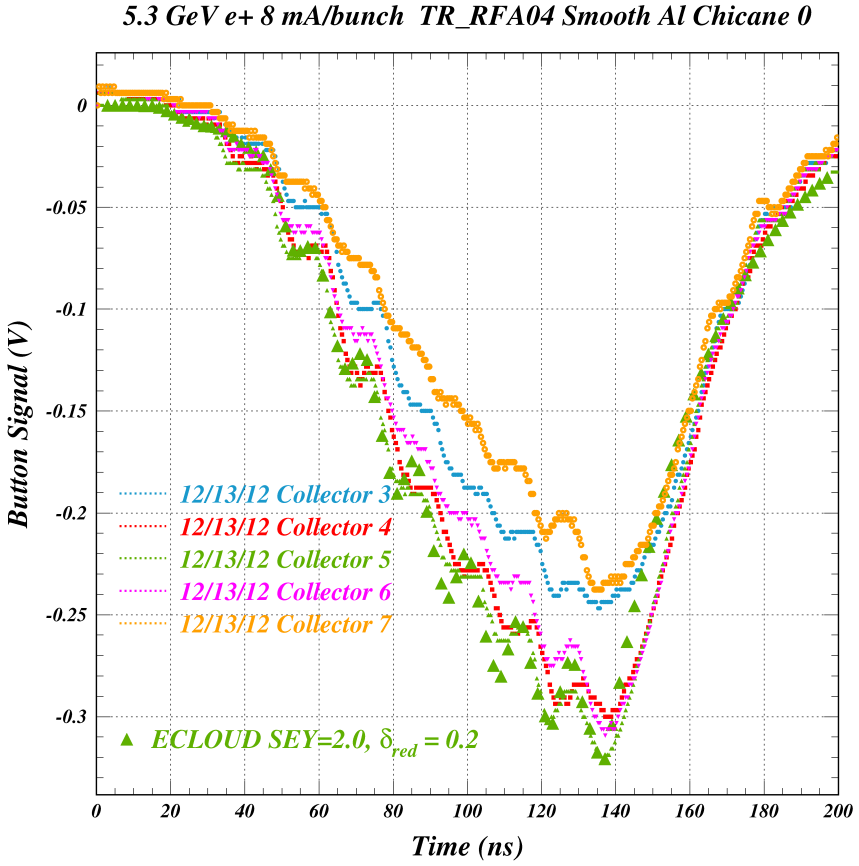
17 April 2013

Progress in modeling the TR RFA Data

Status on 10 April

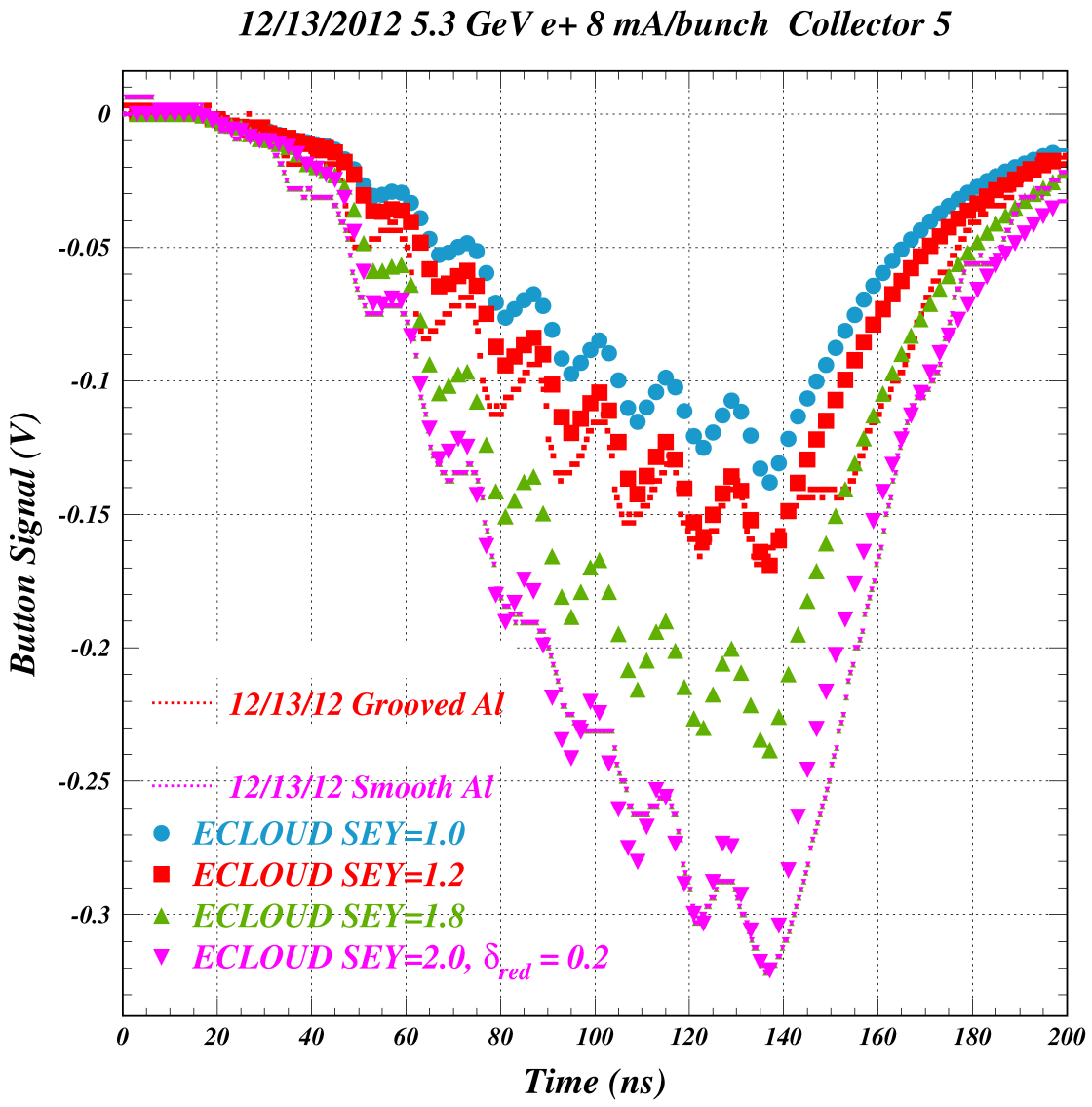


Present Status



Removed bug in RC time constant convolution. RC unchanged at 25 ns.
Tuned photoelectron energy distribution, photon rate, RFA acceptance function.
Canonical Al secondary yield model unchanged: $\delta_{ts} = 1.8$, $\delta_{red} = 0.2$, $\delta_{el} = 0.4$

Sensitivity to the secondary emission model

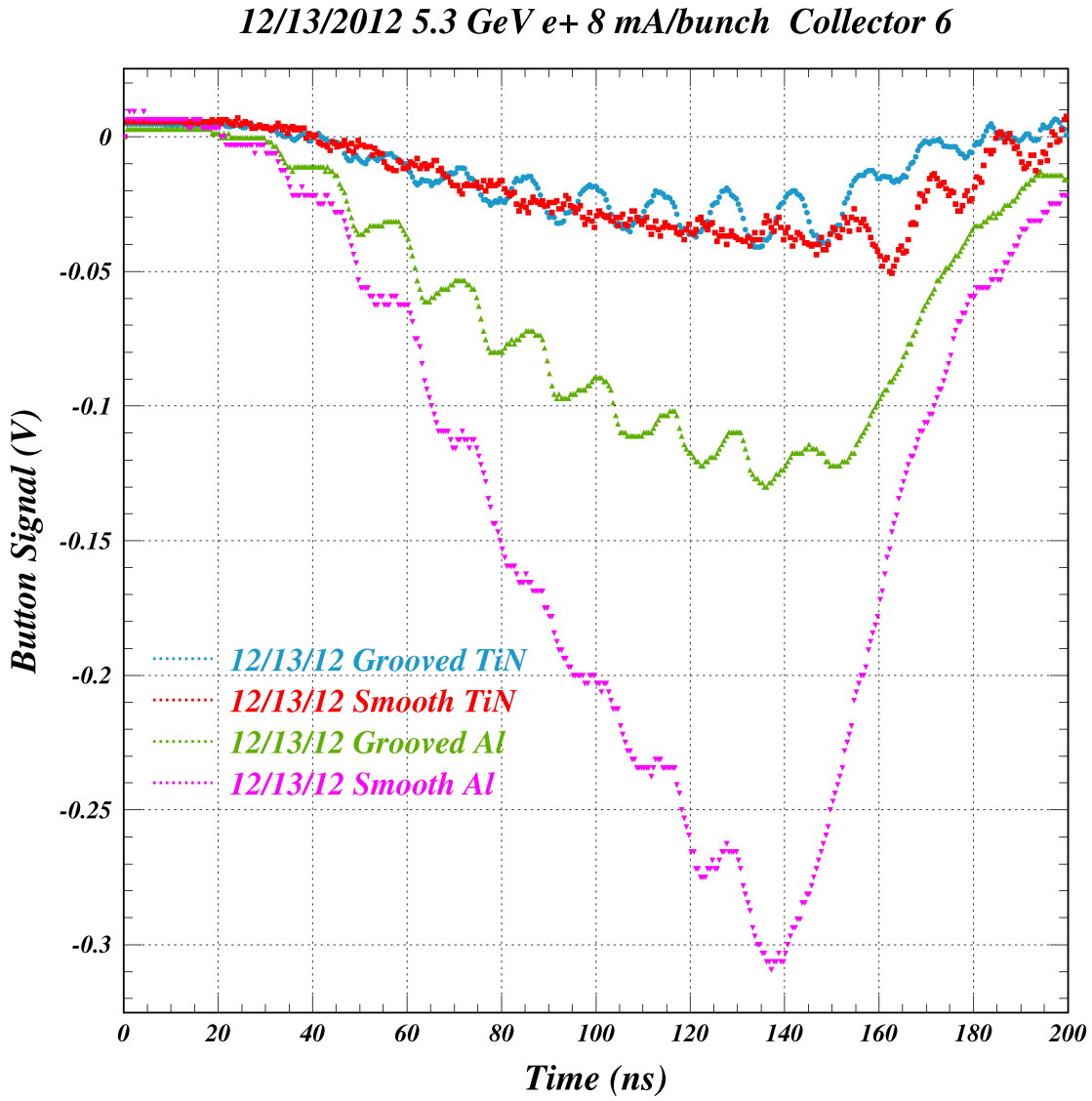


In contrast to the modeling studies for the shielded pickup data with SEY-mitigating coatings, the photoelectron production model is unchanged in the time-resolved RFA experiments, since the photoelectron production is predominantly at the primary photon impact point on the outside of the vacuum chamber.

This example comparison shows the sensitivity to the peak secondary yield to be better than 10%. Is this plot a candidate for our IPAC'13 paper?

This determination of the effective SEY value for grooves should instruct our upcoming publication on the electron cloud buildup analysis for the ILC damping ring. However, in that design we recommend TiN-coated grooves.

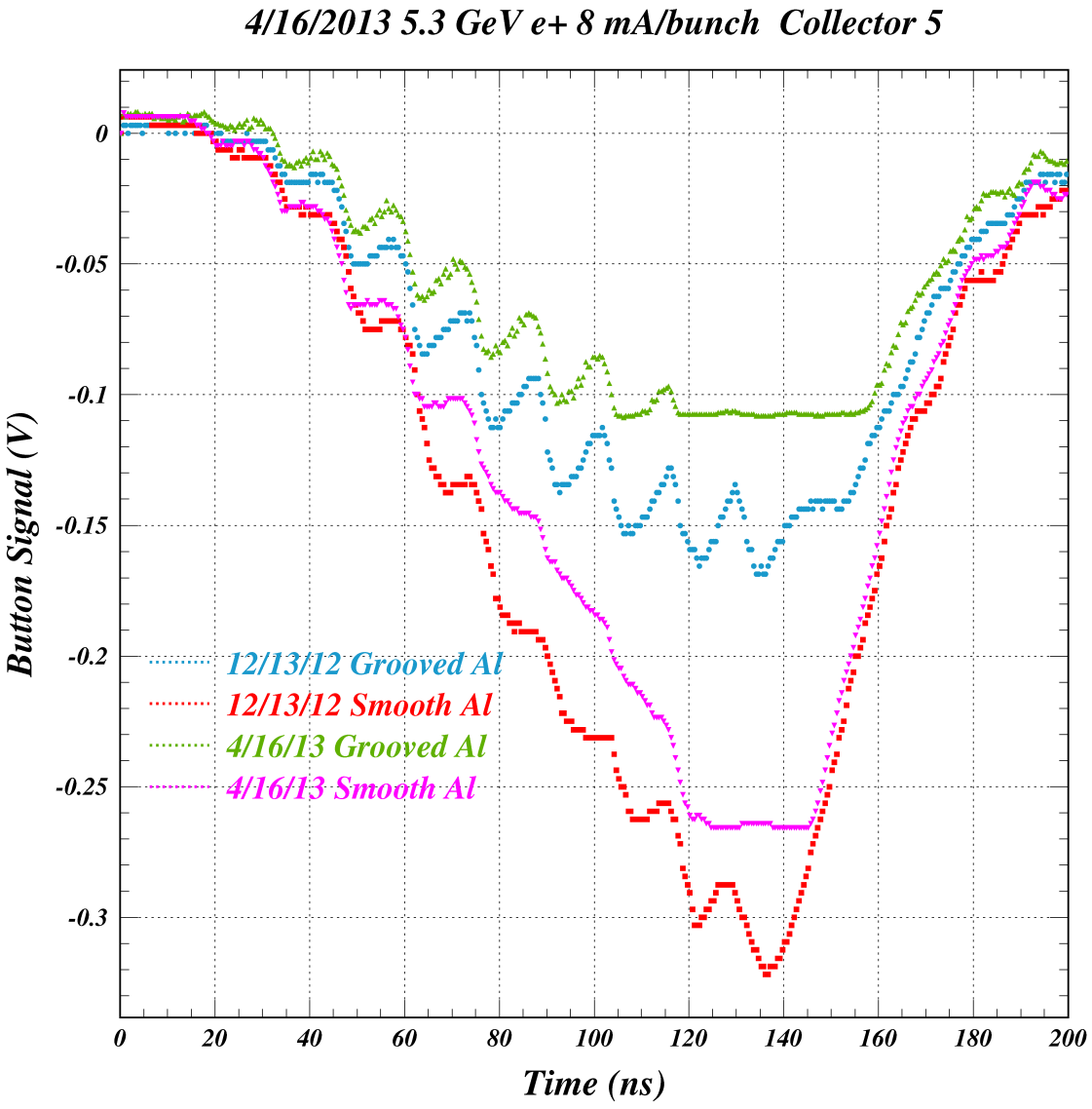
Effectiveness of TiN-coated grooves



Is it worthwhile going to the effort of using grooves in a TiN-coated vacuum chamber?

JPS reports that when the chicane magnetic field is set to 800 G, these already-small signals disappear entirely.

First look at yesterday's measurements by JPS



Some apparent reduction in SEY.

There is an opportunity today to remedy the saturation problem. The shift starts half an hour from now.

SPU and time-resolved RFA collector geometries

	Shielded pickups	Time-resolved RFAs
Number of holes	169	261
Hole diameter	0.76 mm	1.7 mm
Transparency	29.8%	15.4%
Hole depth	1.8 - 2.4 mm	5.0 - 7.5 mm
Tan Θ_{max}	0.32 - 0.42	0.23 - 0.34
Θ_{max}	18-23 degrees	13-19 degrees
Number of collectors	3	9
Collector pitch	14 mm	5.8 mm
Collector width	18 mm (round)	5.8 mm