Cornell University
Laboratory for Elementary-Particle Physics

New Measurements and Plans for Cloud Trapping and Clearing Experiments during the Ongoing CESRTA Run

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Electron Cloud Meeting

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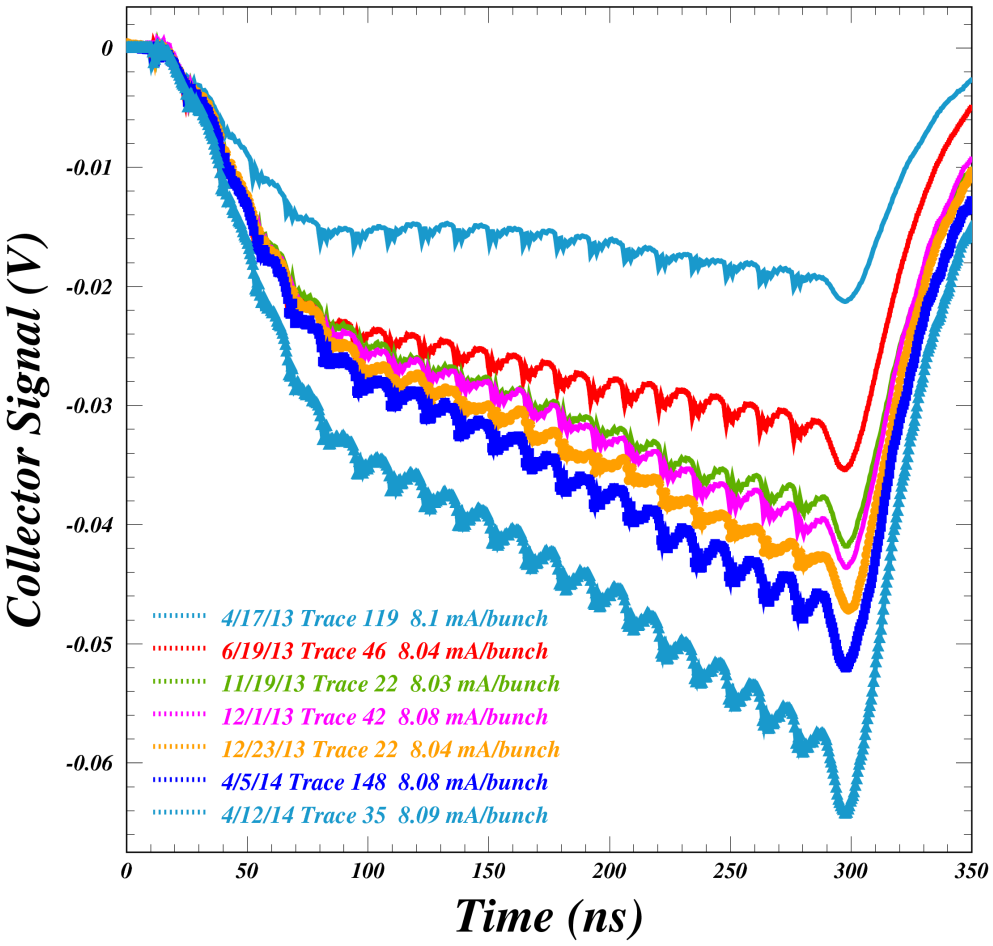
Why is the QSPU signal increasing on a long time scale?



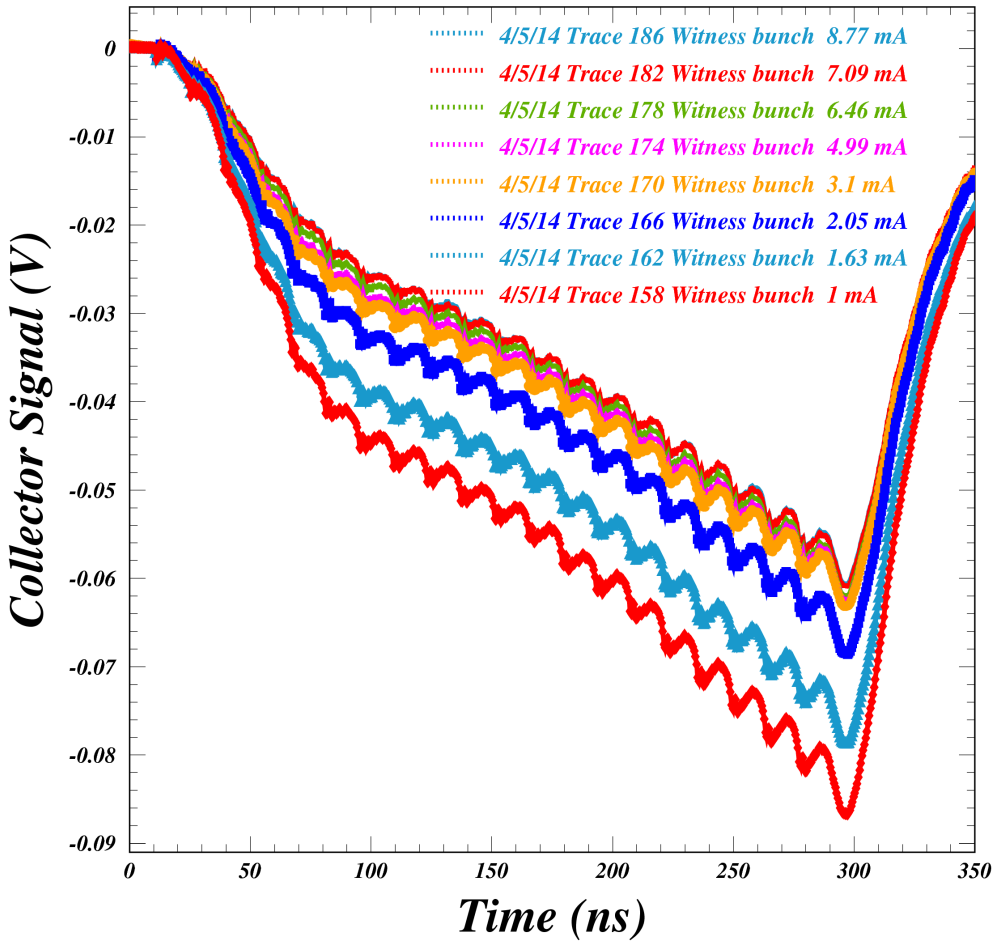
The first measurements in April and June of 2013 indicate a qualitative change probably related to SEY kinematic effects.

Since then, the increase is consistent with a change in photoelectron production rate.

The signal increase is quite irregular in time.

Caveat: 4-ns bunch current monitor has reproducibility problems at the 0.1 mA/bunch level. And $\Delta S/S \approx 8\, \Delta I/I$

Dependence on Clearing Bunch Current



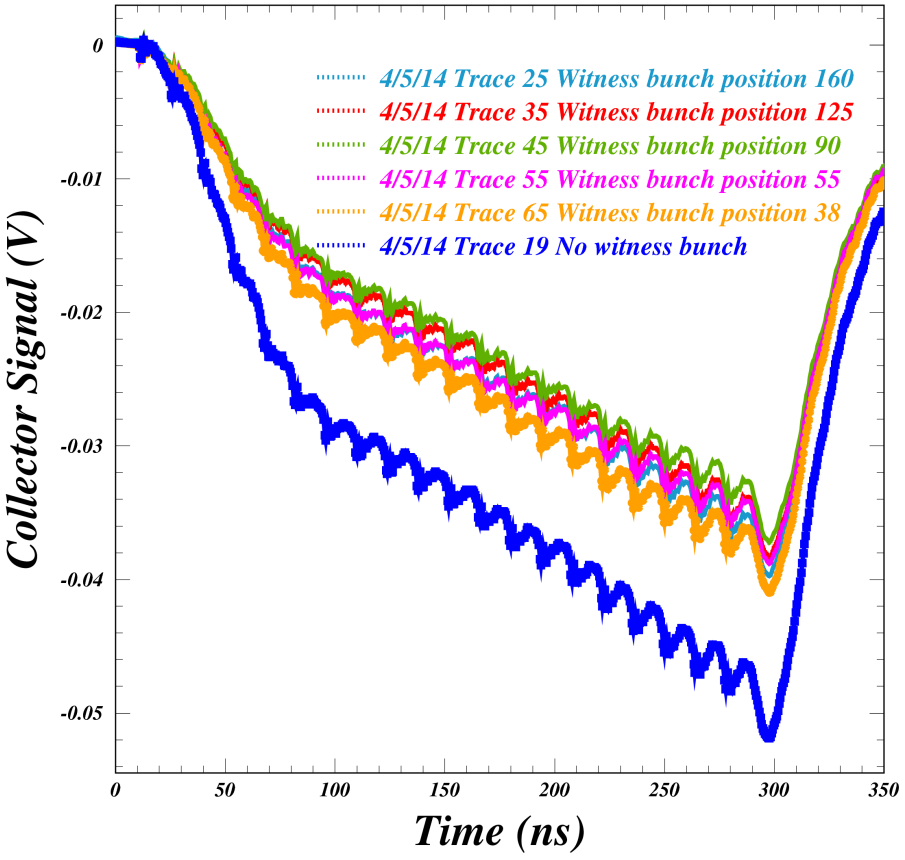
20-bunch e+ train with 8 mA/bunch

Witness bunch injected at position 90 of 183.

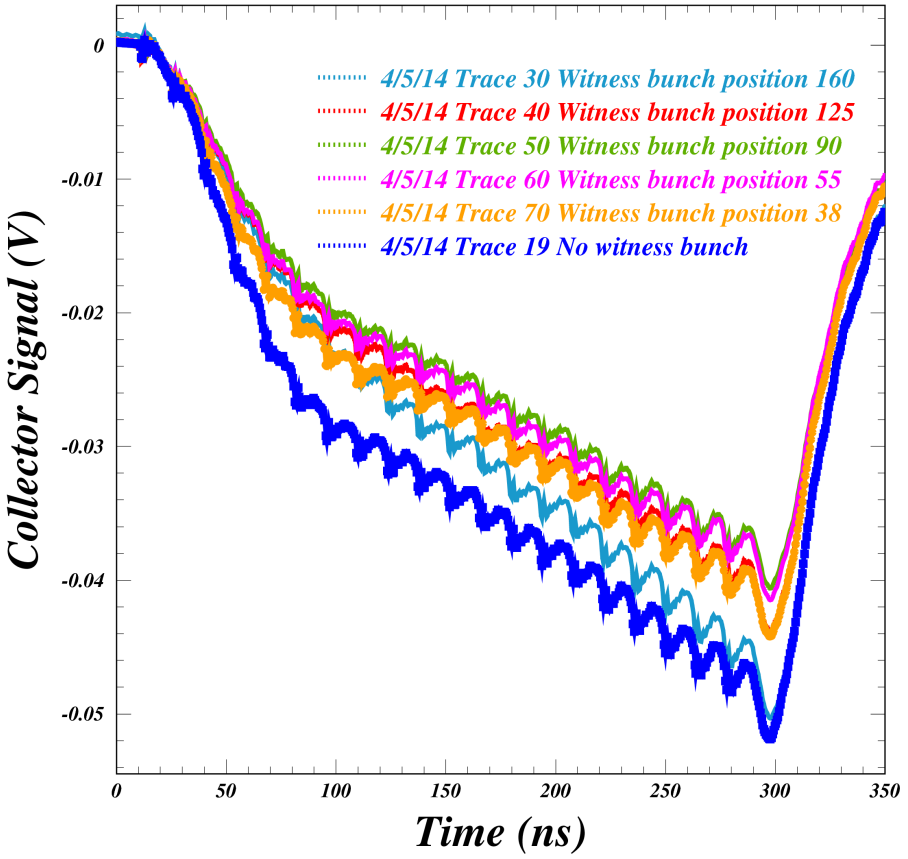
Just a few mA suffice to obtain nearly all the clearing effect.

Dependence on clearing bunch/train position

Single clearing bunch

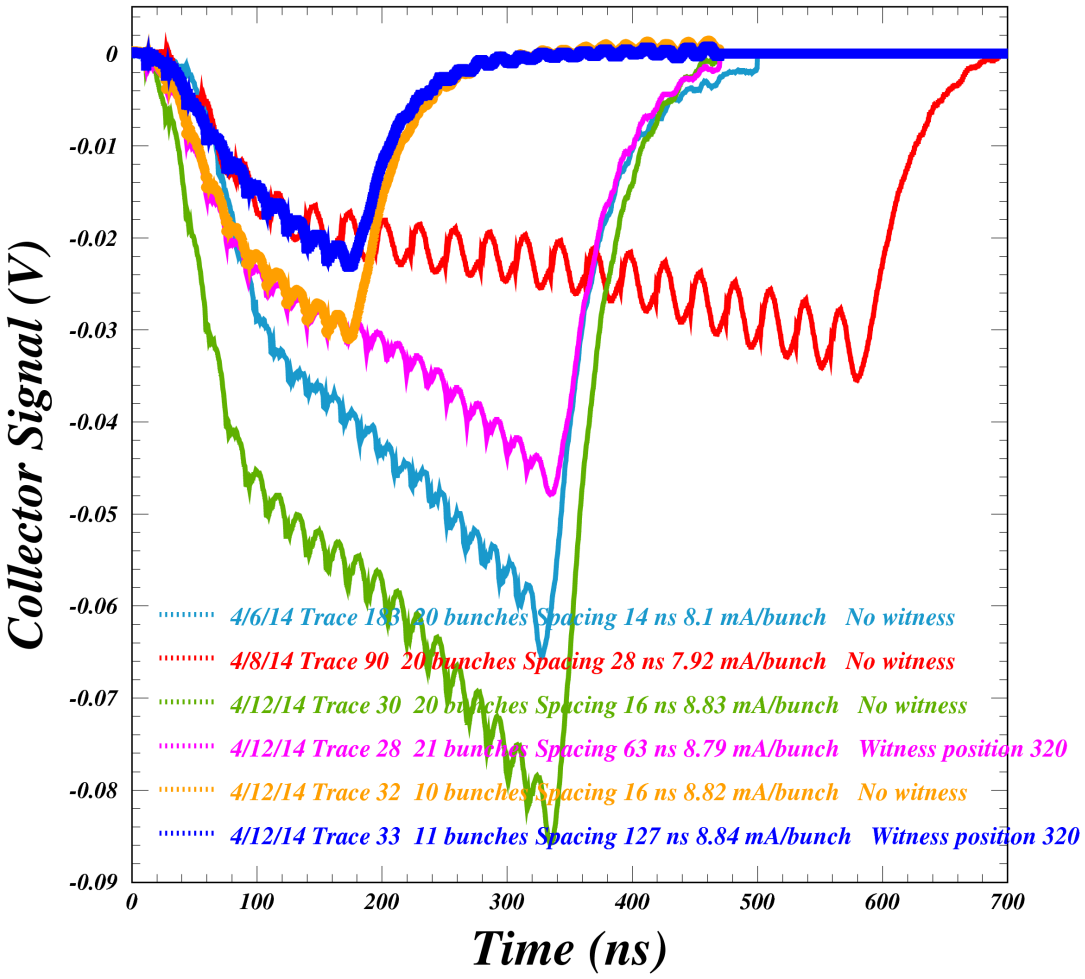


6- bunch clearing train



The clearing effect depends only weakly on position. A single bunch is more effective than a 6-bunch clearing train. The optimal position is about halfway around the ring.

First Look at the Dependence on Bunch Spacing



I) The signal from the 20-bunch train with 28-ns spacing is about half of that of the 14-ns spaced train. The trapped cloud which contributes to the signal is cleared by the first three bunches rather than the first six. Will the trend hold for spacings between 14 and 28 ns?

II) For the 16-ns spacing, comparison of the 10-bunch and 20-bunch train signals indicates significantly more trapping than for the 14-ns spacing. (Aside: the 20-bunch signal is higher than for the 14-ns spacing because the bunch current is higher.)

III) The clearing bunch is much more effective for the 16-ns spacing than for the 14-ns spacing, reducing the signal by nearly a factor of two for the 20-bunch train.

IV) For 16-ns spacing, the signal for the 20-bunch train with a clearing bunch is very similar to that of the 10-bunch train with no clearing bunch. This was NOT the case for the 14-ns spacing, so it may be a red herring/coincidence.

Near-term plans

I) Investigate spacings of 14, 16, 20, 24, 28 ns with 10- and 20- bunch trains with 8 mA/bunch with and without a clearing bunch at position 90/320. Each fill requires 30 minutes. Adding the clearing bunch requires an additional 15 minutes. We already have 14 ns (20 bunch only), 16-ns (complete) and 28-ns (20 bunch only, no witness). Time required: 4x1.5 hrs = 6 hrs.

II) 30 bunch trains

III) Fine current scan for resonances (partly done, no clear sign of resonance)

IV) More ideas

<u>Available time</u>

1) 6 hours tonight

2) 10 hours Friday night

3) 12 hours contingency Saturday night/Sunday owl