Updated Status of the Modeling of

Electron Cloud Trapping in Q48W
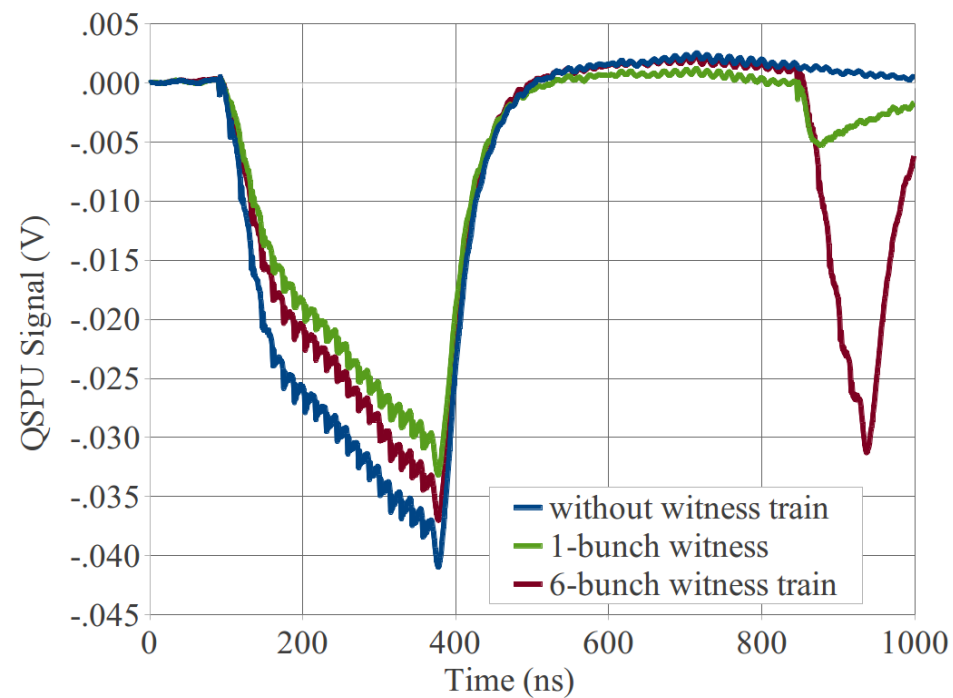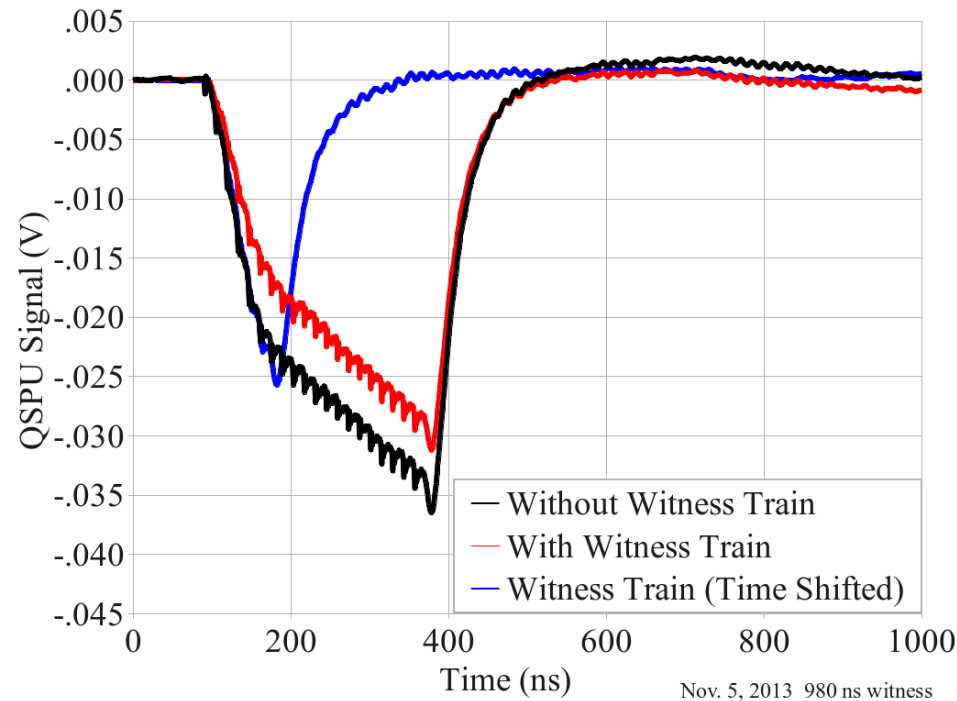
-- Slides of 27 November updated and augmented --

-- Updated following meeting with corrected wall profile on slide 7 as used by Synrad3D --
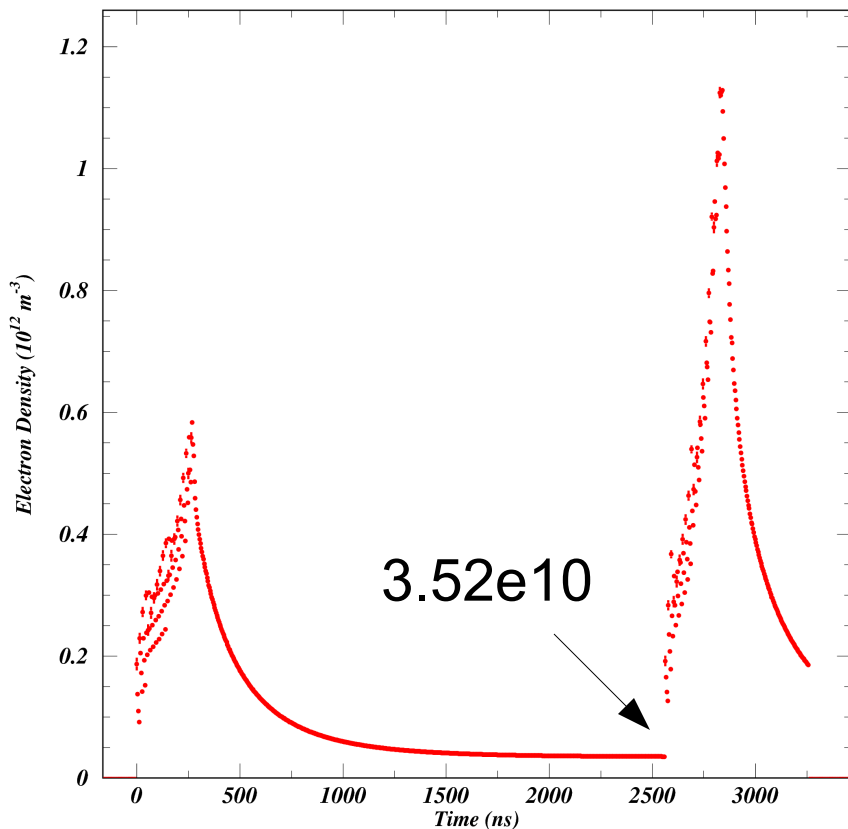
Jim Crittenden

Electron Cloud Meeting

4 December 2013

Nov. 5, 2013 980 ns witness

About 15-20% signal reduction for 6-bunch trains at 490 and 980 ns delay

Single bunch at 490-ns delay provides increased clearing.

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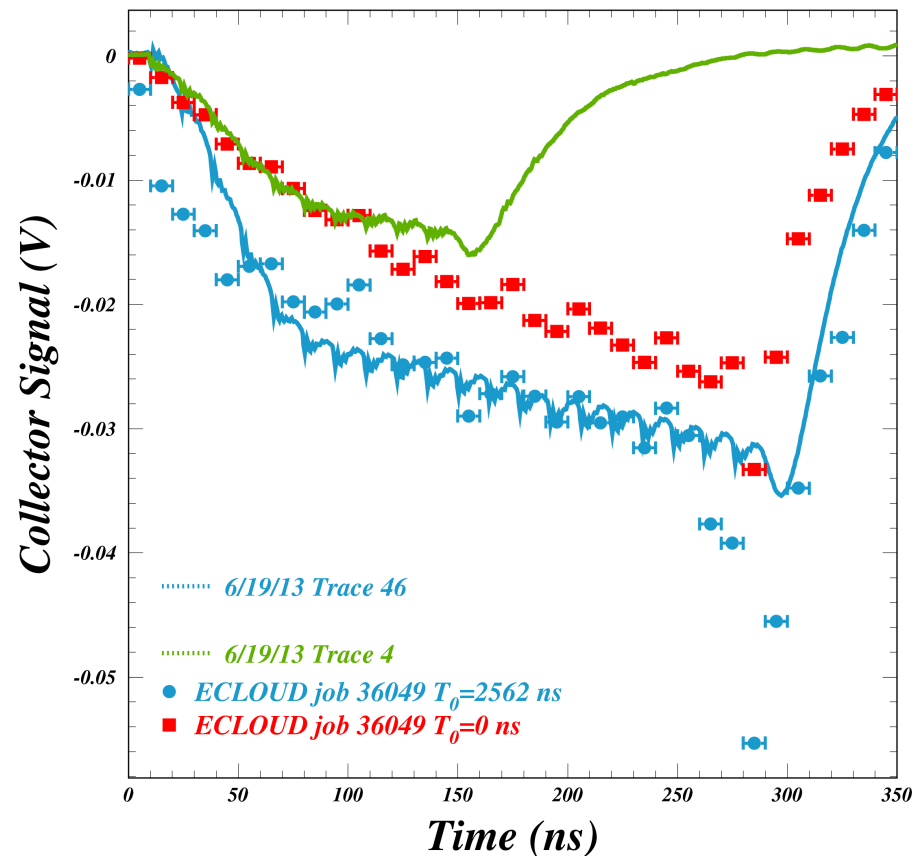
Without witness train

With 6-bunch witness train
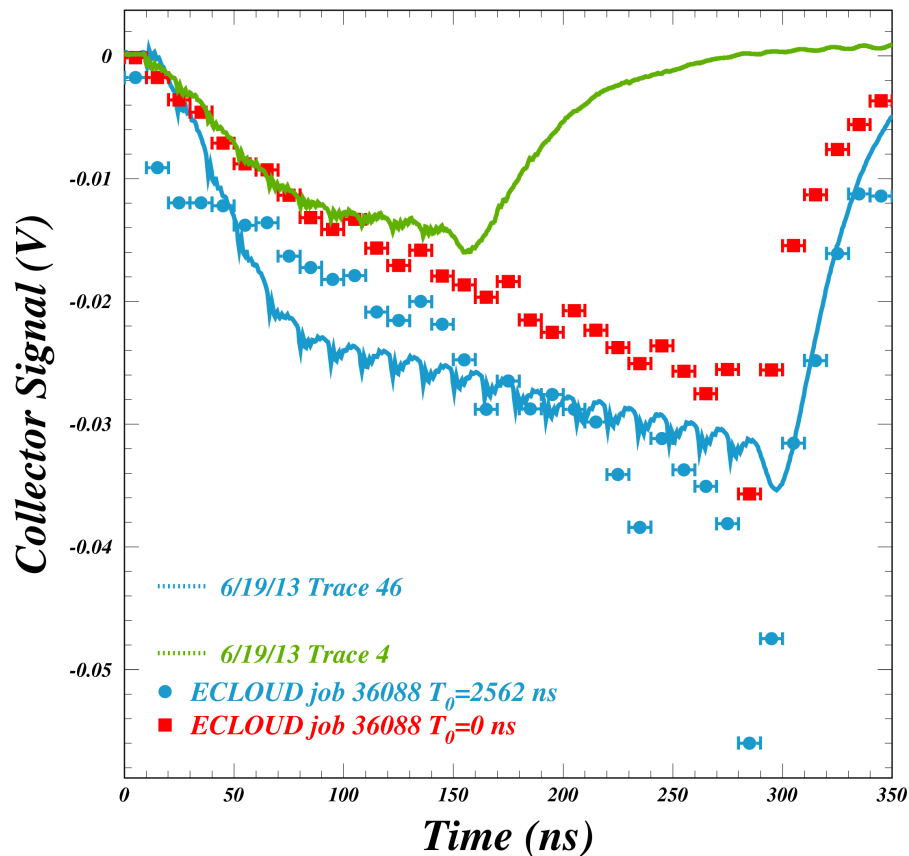starting at bunch 91 (994-ns delay)
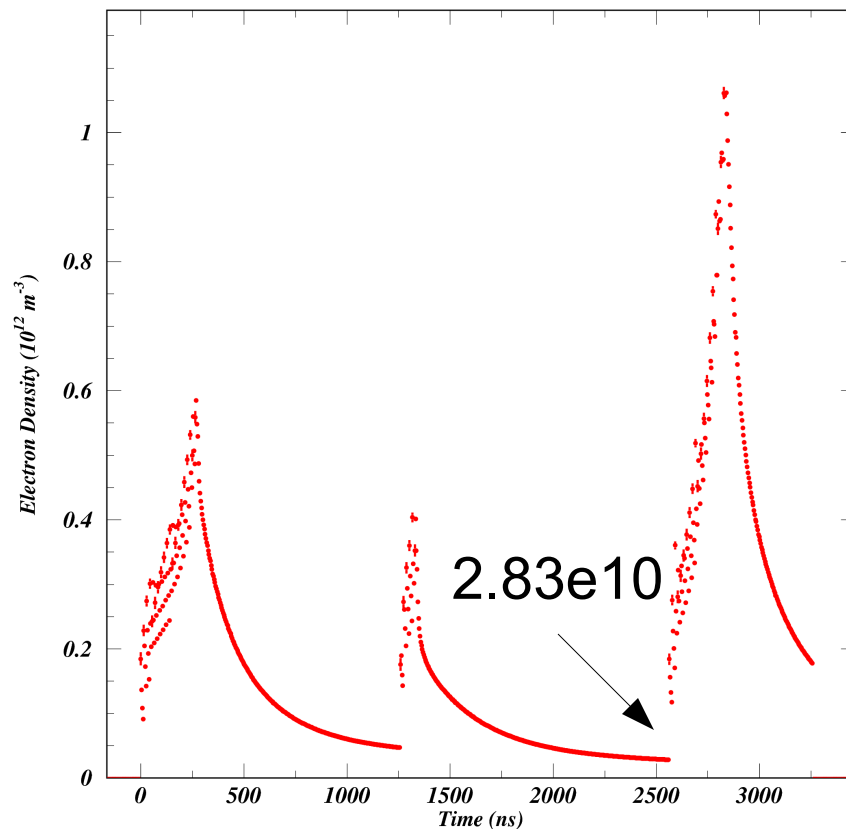
0.35/7.96 = 4.4% of cloud is trapped with no witness train.
Model of cloud buildup shows clearing effect at 20% (1-2.83/3.52).
Consistent with signal reduction. (Delay still wrong, should have been 980 ns)

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Without witness train

With 6-bunch witness train
starting at bunch 91 (994-ns delay)

6/19/13 Trace 46

6/19/13 Trace 4

● ECLOUD job 36049 T_0=2562 ns
■ ECLOUD job 36049 T_0=0 ns

6/19/13 Trace 46

6/19/13 Trace 4

● ECLOUD job 36088 T_0=2562 ns
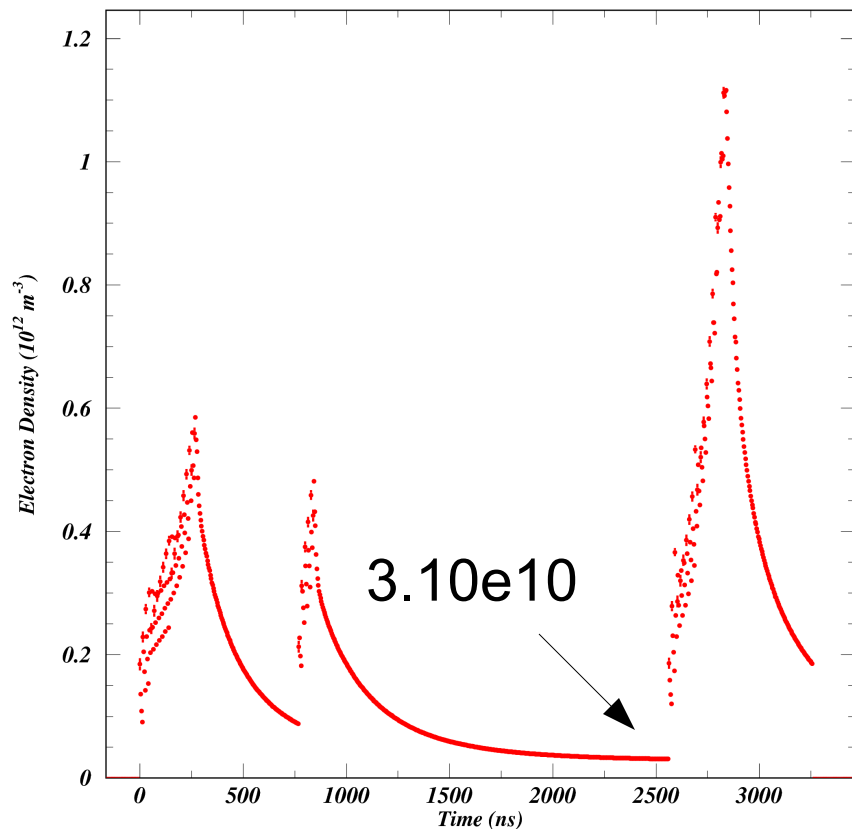■ ECLOUD job 36088 T_0=0 ns

**Secondary yield model (stainless steel) improved. Statistical uncertainties to be added.
Signal reduction is found, but statistics still insufficient for 20% effect (4-day job).**

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With 6-bunch witness train
starting at bunch 56 (504-ns delay)

With single witness bunch
At bunch 56 (504-ns delay)
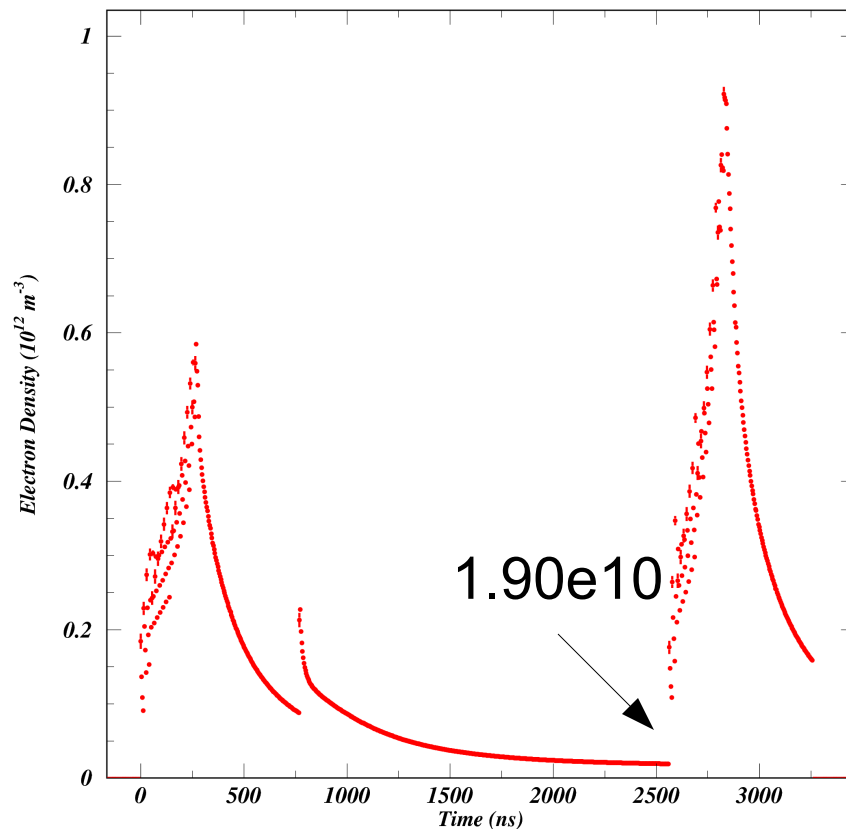
Single bunch is more effective.
Density reduced to 54%, rather than 88%, somewhat more than the measured signal.

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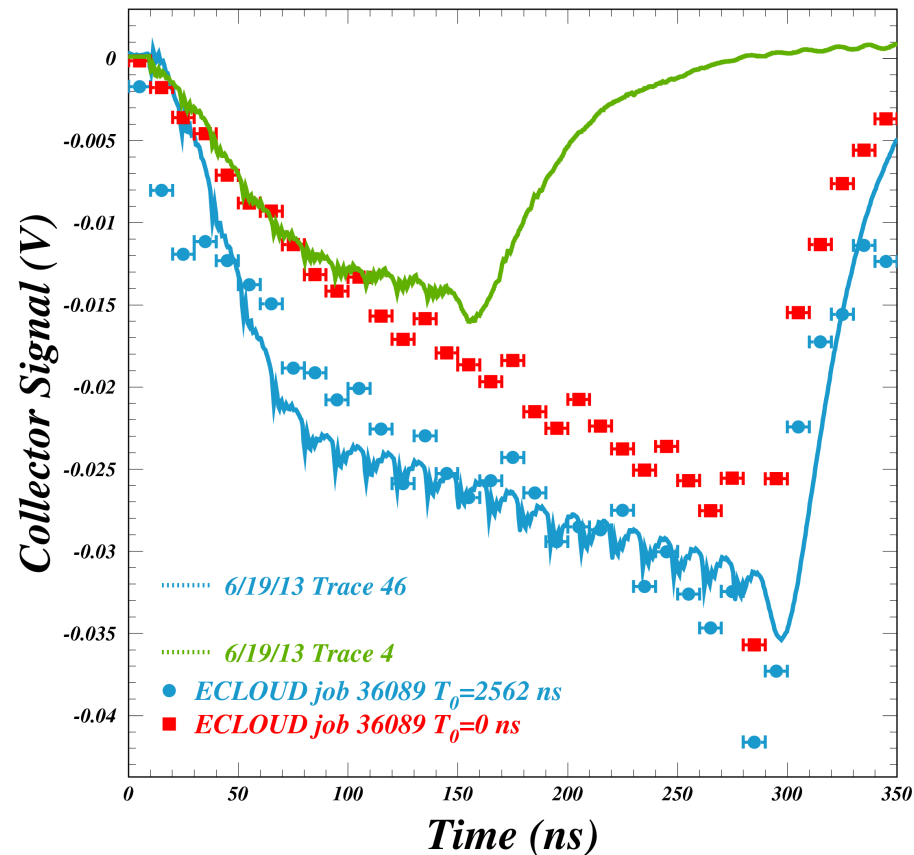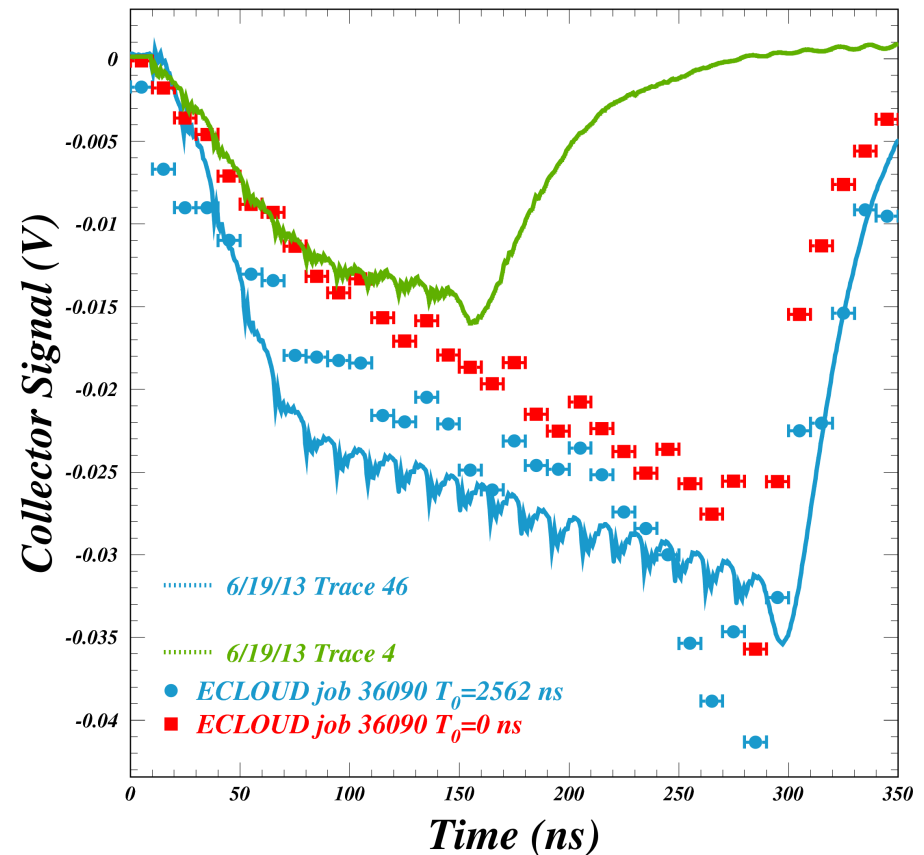
With 6-bunch witness train
starting at bunch 56 (504-ns delay)

With single witness bunch
At bunch 56 (504-ns delay)

Left plot legend:
- 6/19/13 Trace 46
- 6/19/13 Trace 4
- ECLOUD job 36089 T_0=2562 ns
- ECLOUD job 36089 T_0=0 ns

Right plot legend:
- 6/19/13 Trace 46
- 6/19/13 Trace 4
- ECLOUD job 36090 T_0=2562 ns
- ECLOUD job 36090 T_0=0 ns

Axis labels: *Collector Signal (V)* vs *Time (ns)*

Modeled signal also shows increased clearing effect of single bunch.

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Questions about Synrad3D for CESRTA Layout
Why does it give a factor of about 50 high number of reflected photons at Q48W?

Wall file status as of June, 2010
Rudimentary with some detail added in L3

Wall file status as of June, 2011
S. Milashuk, D.C. Sagan, Y. Li
Extremely detailed throughout CESR
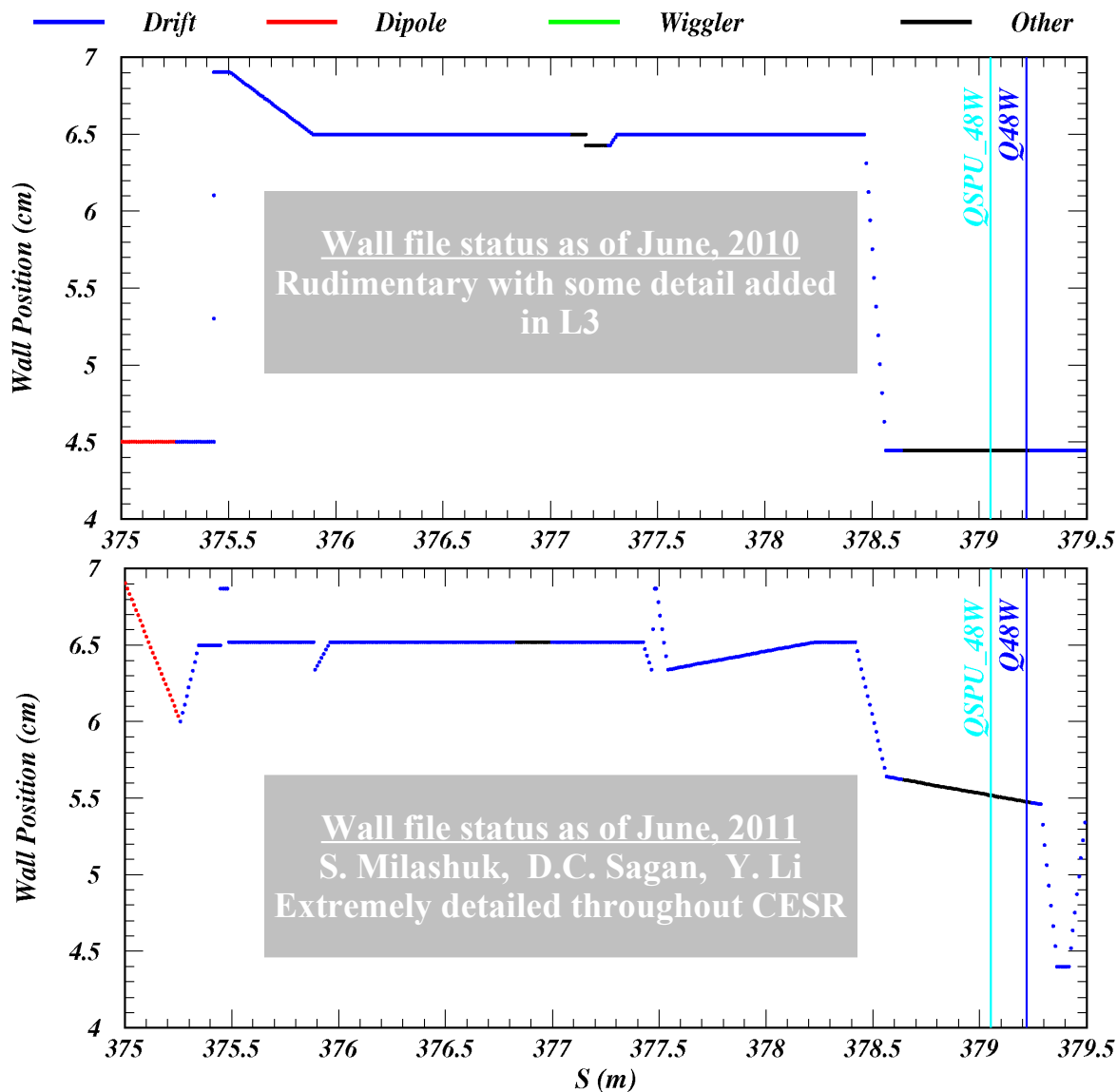
Upstream of Q48W (for positrons) there is a wide vacuum chamber where a vertical separator used to be.

This was roughly modeled in the wall profile file that I have been using for Synrad (2D) calculations of s.r. photon fluxes.

Yesterday I learned from DCS that the program PROFILER_SYNRAD uses the detailed work of S. Milashuk et al to make BOTH 2D and 3D wall profile files. So I ran Synrad with the 2D version, since Synrad provides plots of the wall position.

The detailed model shows a big vacuum chamber in the soft bend B48W (1.25 kG, E_C = 2.4 keV).

Is Synrad3D correctly handling this complicated geometry?
Also, the modeled Q48W v.c. is wrong. Beginning in January, 2013, it is cylindrical with radius 4.7752 cm.