CesrTA Ring-wide RFA Measurements

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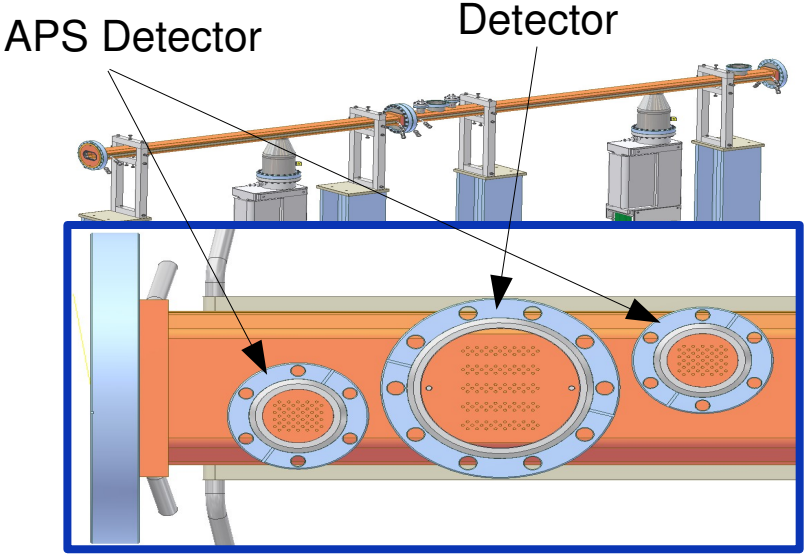
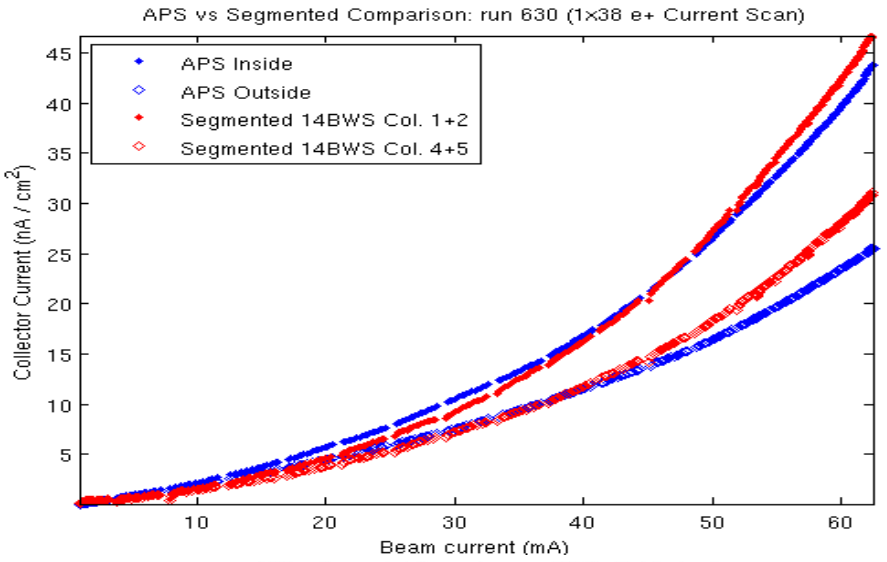
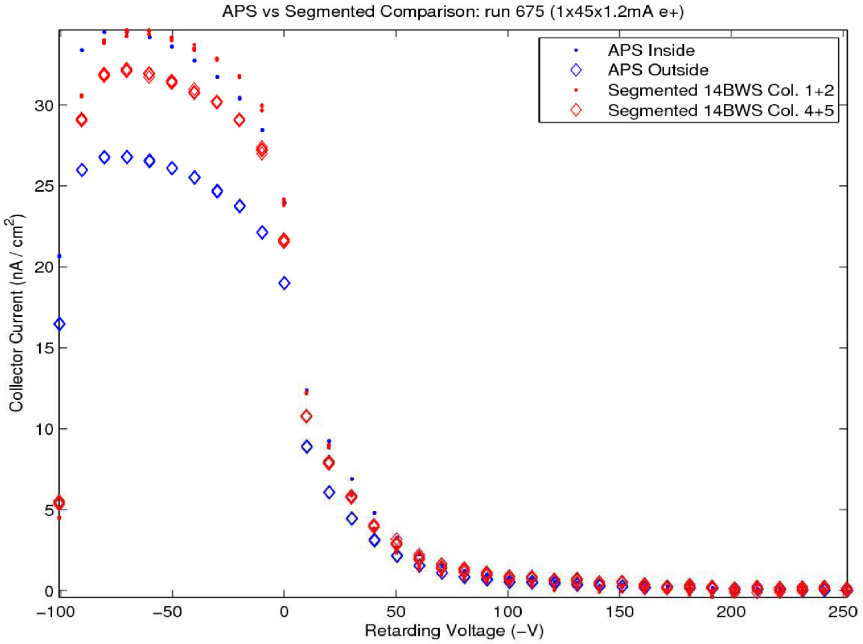
Cornell Style vs. APS

- Need to benchmark performance of new thin RFA design.
- Outer four collector pads of segmented detector overlap APS pads on inside and outside of beam-pipe.
- Comparison of machine current scan and energy scan using these detectors.







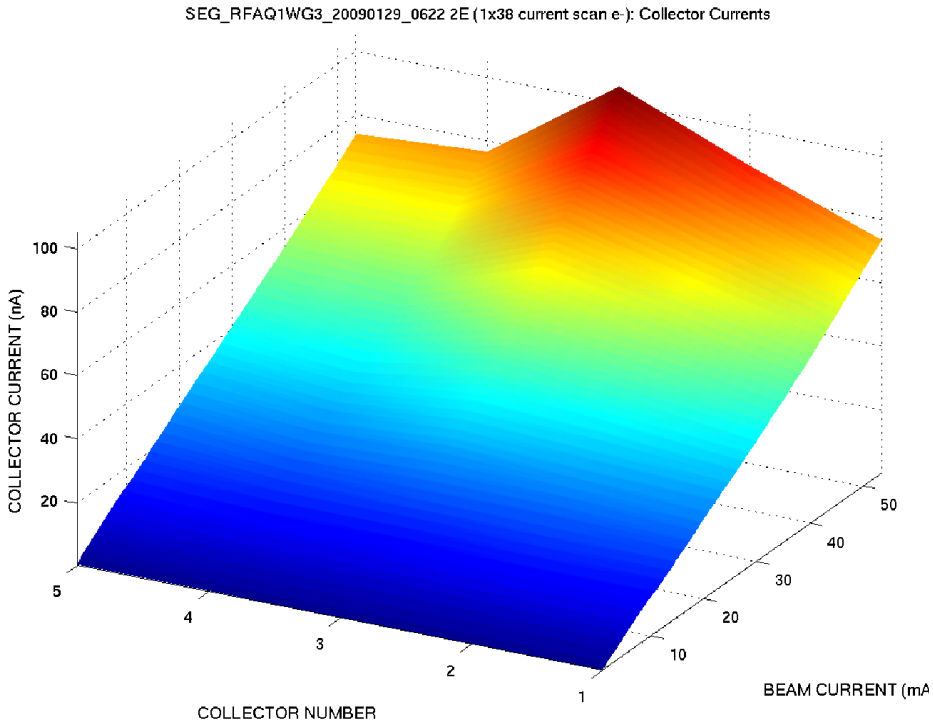
Electrons vs. Positrons

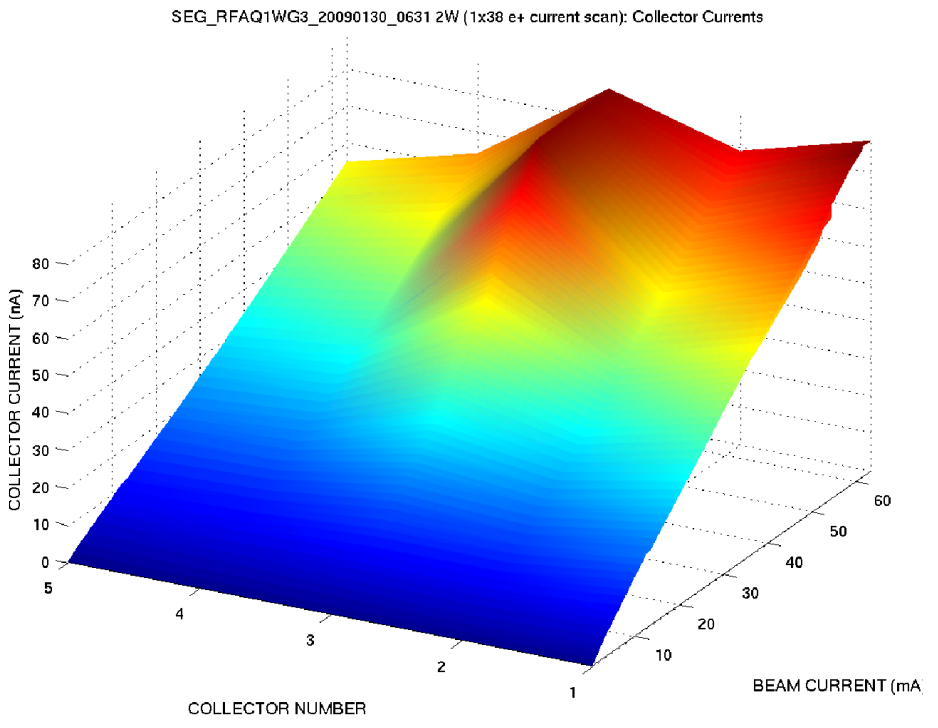
- 2E segmented detector is symmetrically opposite 2W segmented detector.
- 2E should see similar radiation patterns with electrons as 2W does with positrons
- 1 train of 38 bunches, filling all bunches together.

Electrons
2E

5 GeV, 14 ns

Positrons
2W

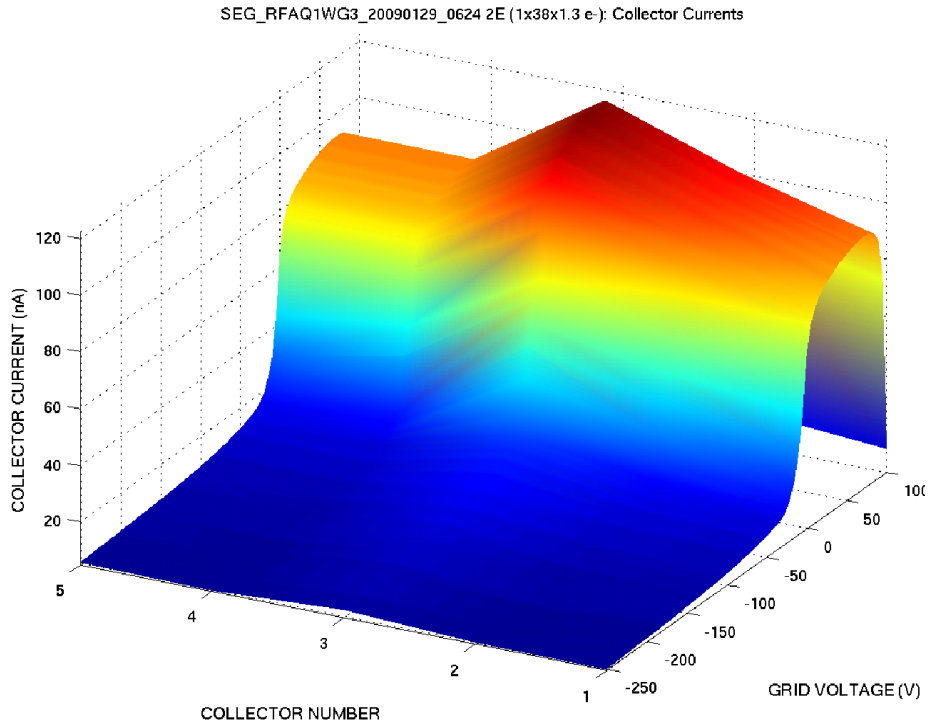




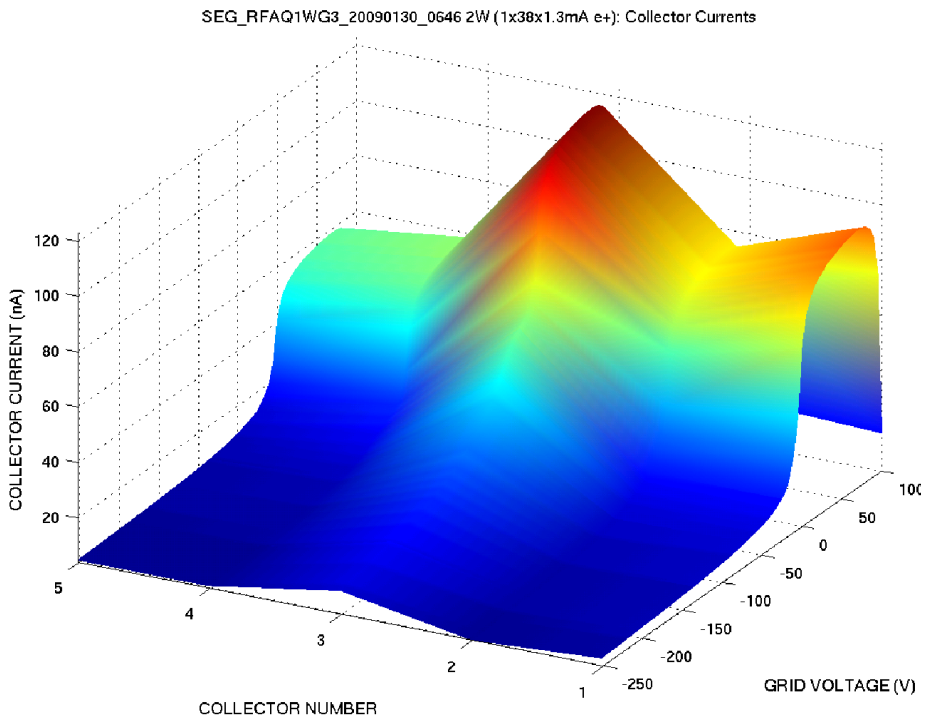
Electrons vs. Positrons

- Energy scan comparing same detectors.
- 1x38x1.3 mA
- 2 GeV, 14 ns
- Wings at similar level, center peak enhanced for positrons.

Electrons
2E



Positrons
2W



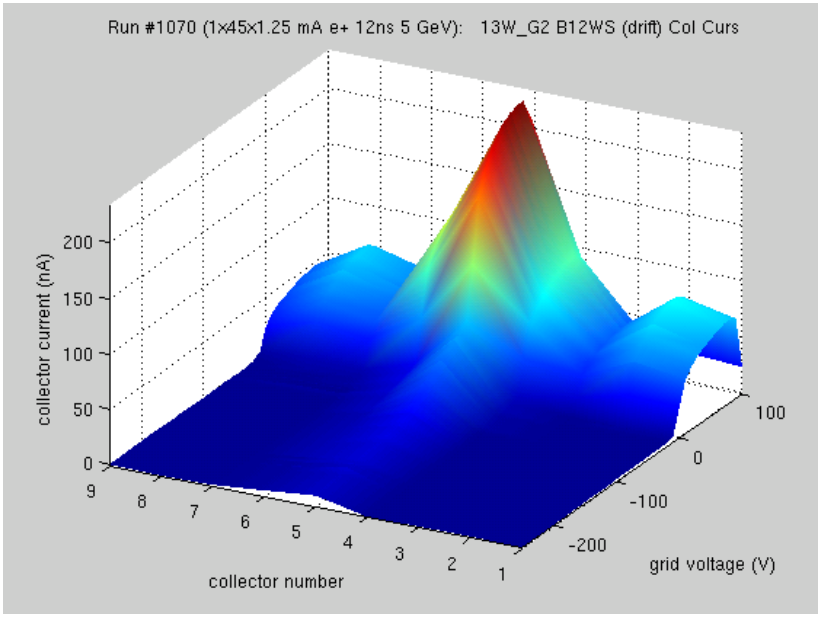
Dipole vs. Fringe Regions

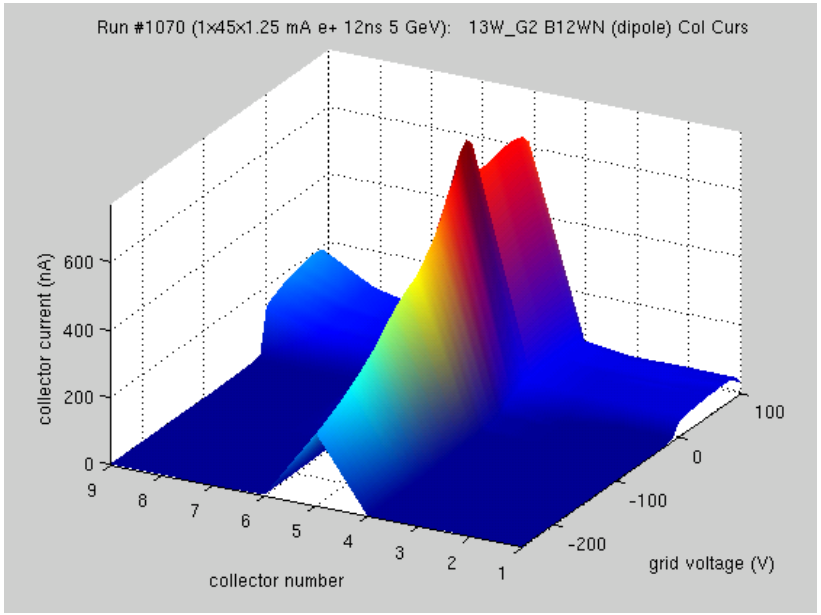
- Neighboring detectors inside and outside B12WN magnet.
- North detector inside of dipole.
- South detector between dipole and sextupole, in fringe field.
- Representative of short drift sections in CESR.
- With large number of dipoles in CESR, cloud in fringe field area may have effects.

Fringe Field
B12WS

Energy scan:
1x45x1.25 mA/bunch
12 ns, 5 GeV positrons

Dipole Field
B12WN





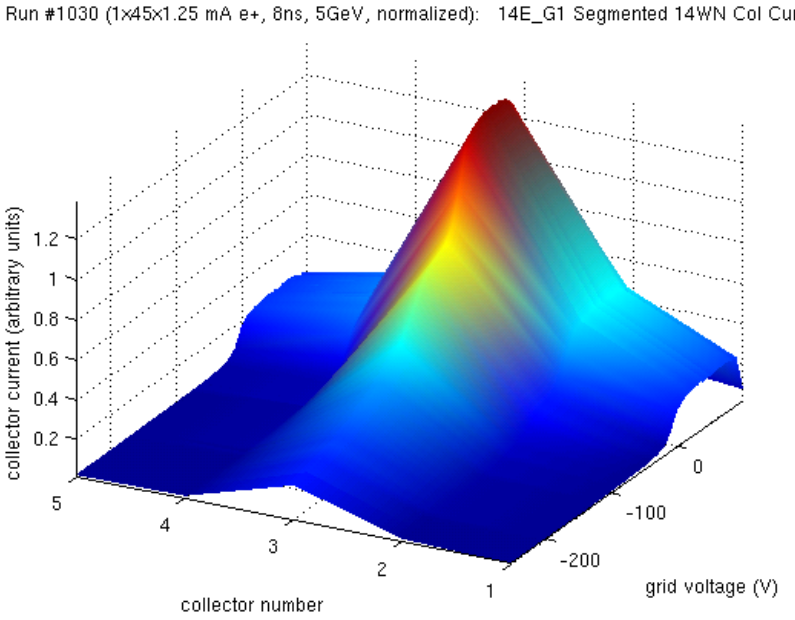
TiN in Drift Region

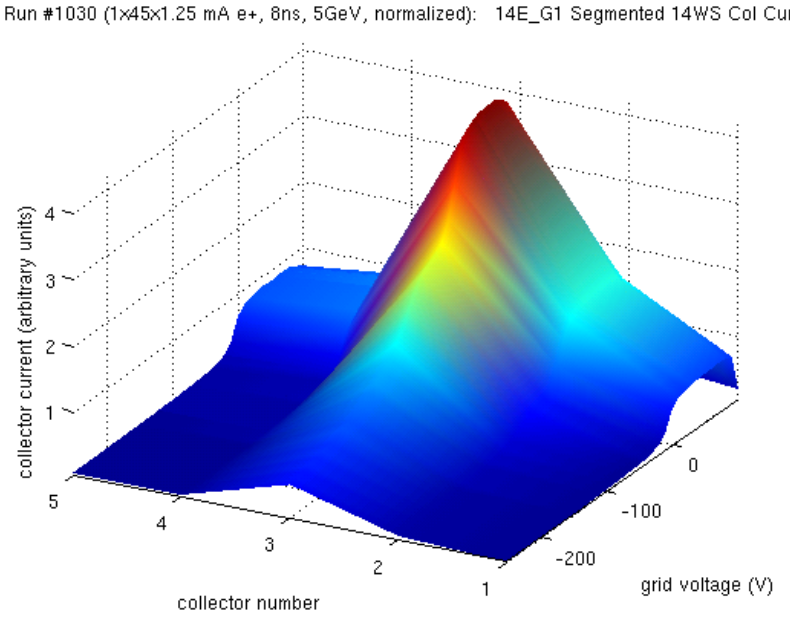
- Neighboring detectors in drift region at 14E.
- North detector in TiN coated Cu chamber.
- South detector in Cu chamber.
- Linearly normalized by photon flux at RFA location.
- Uncoated chamber sees ~4x more response.

Coated
14EN

Energy scan:
1x45x1.25 mA/bunch
8 ns, 5 GeV positrons

Uncoated
14ES





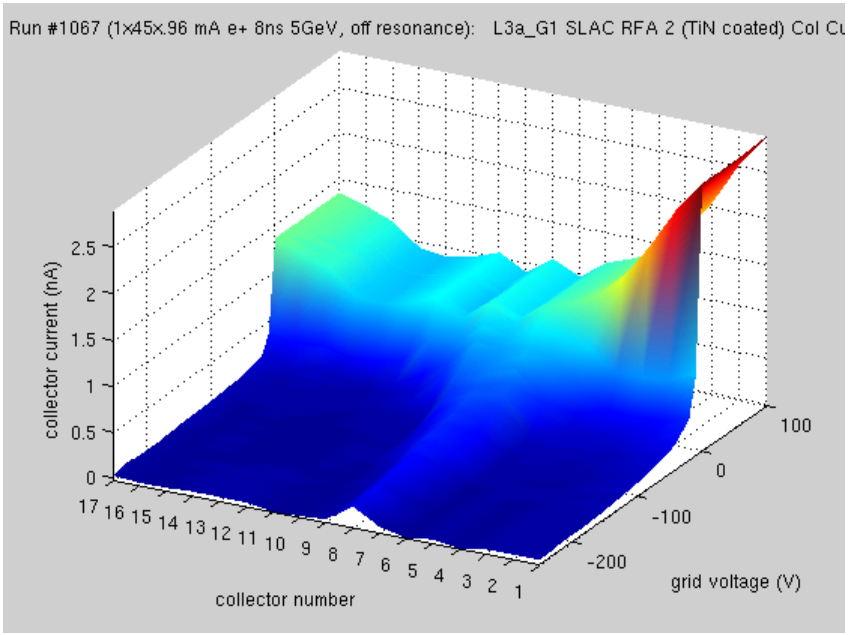
TiN in Dipole Region

- Neighboring detectors in SLAC chicane dipoles.
- RFA 2 in TiN coated Al chamber.
- RFA 4 in uncoated Al chamber.

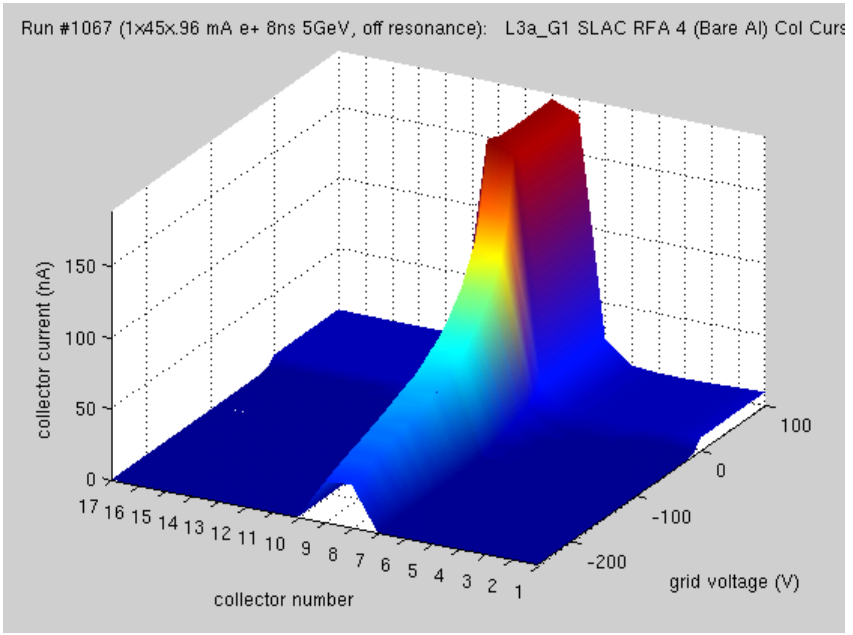
- Response is reduced by ~150x.
- Multipacting peak is suppressed.
- Not on a resonance.

Energy scan:
1x45x.96 mA/bunch
8 ns, 5 GeV positrons

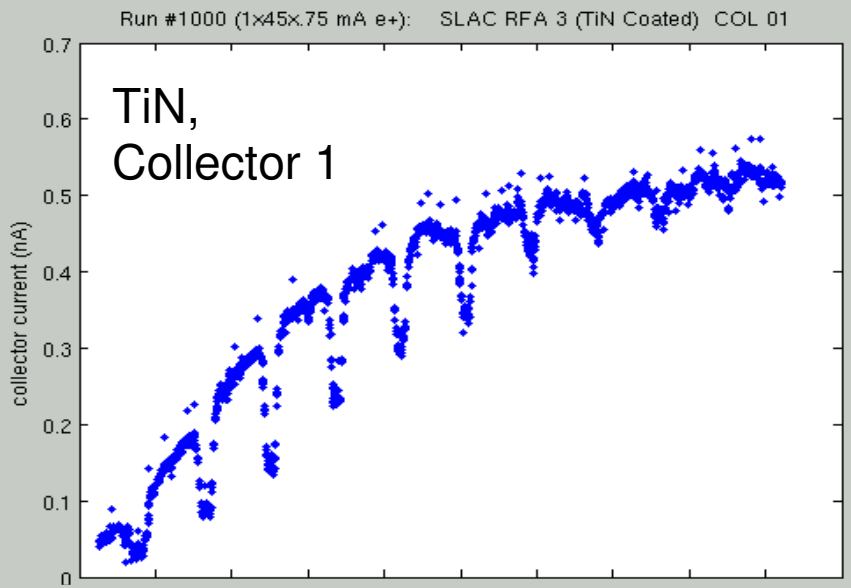
Coated Al
RFA 2

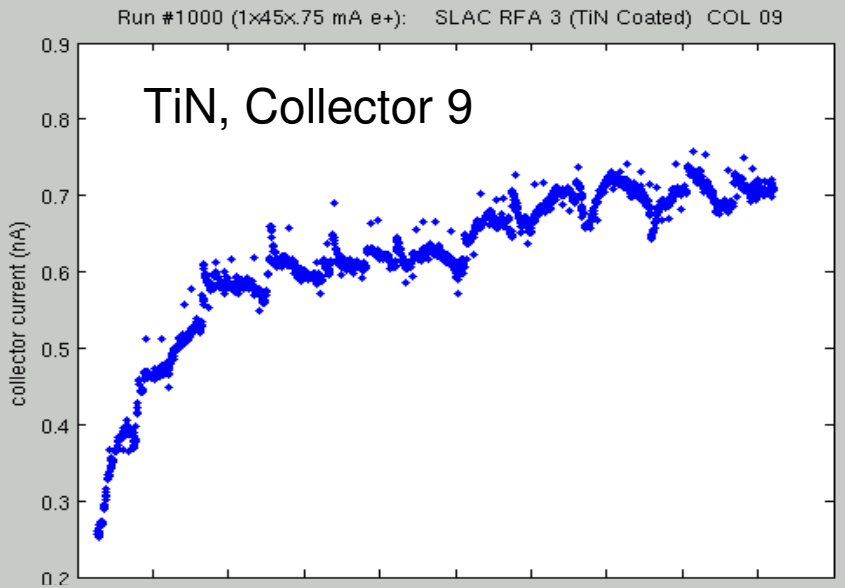


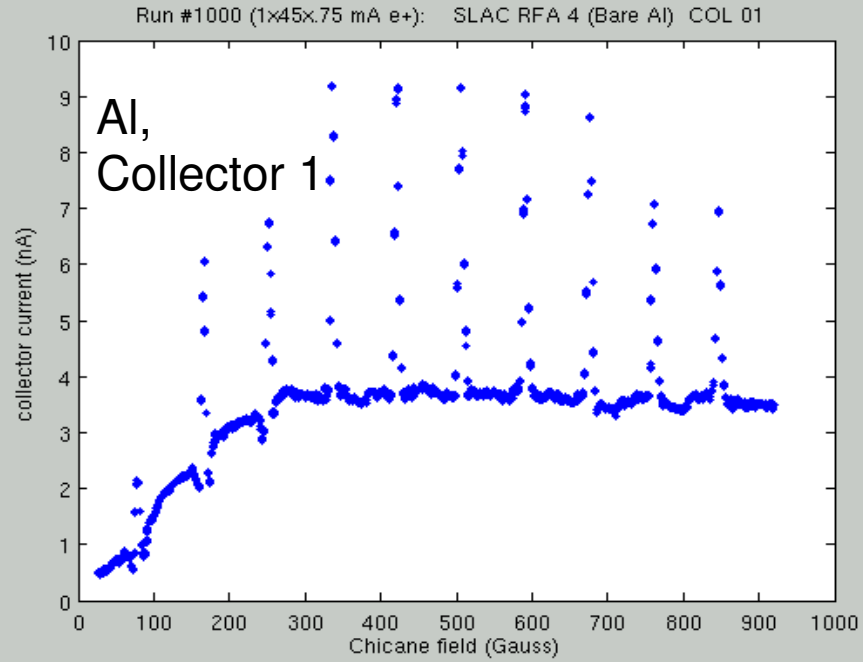
Uncoated Al
RFA 4

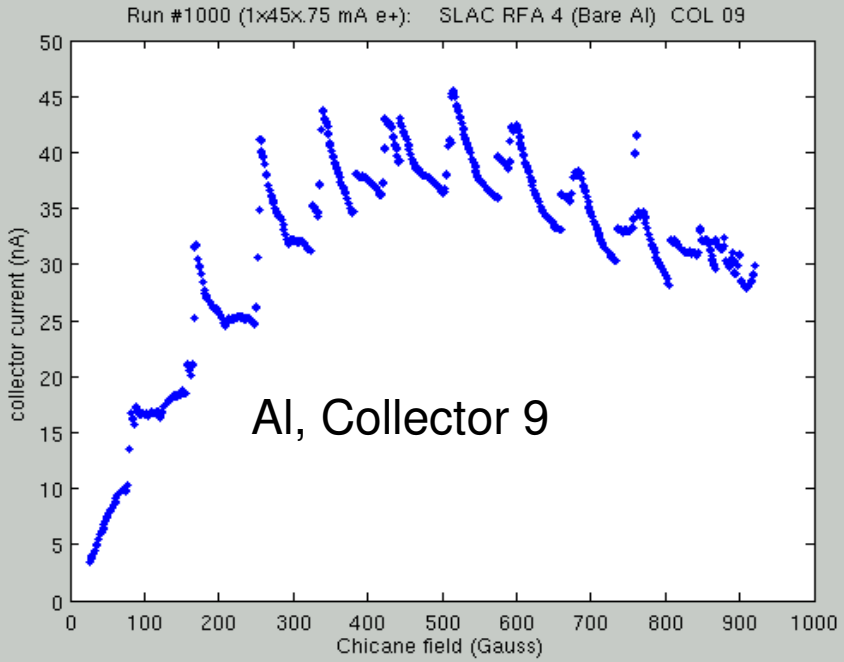


4ns, 2 GeV Chicane Scan

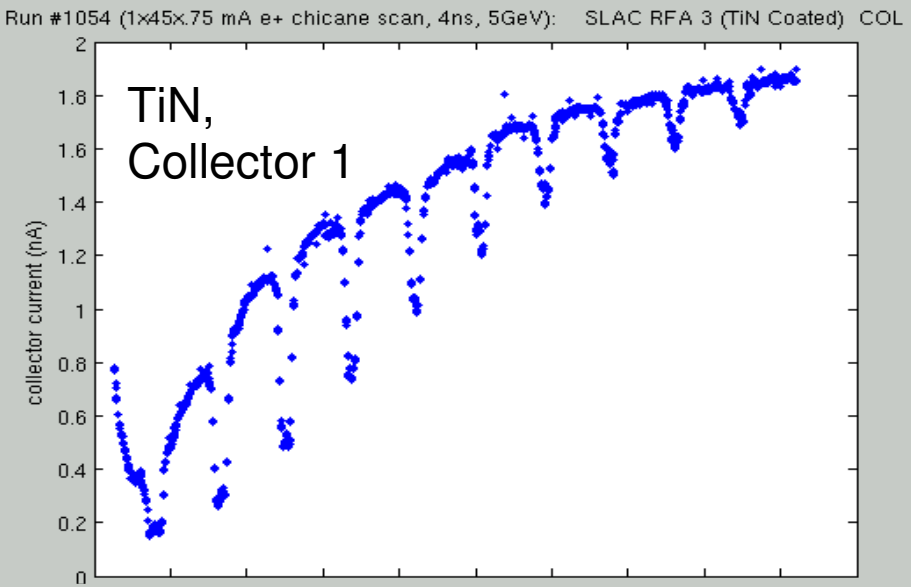


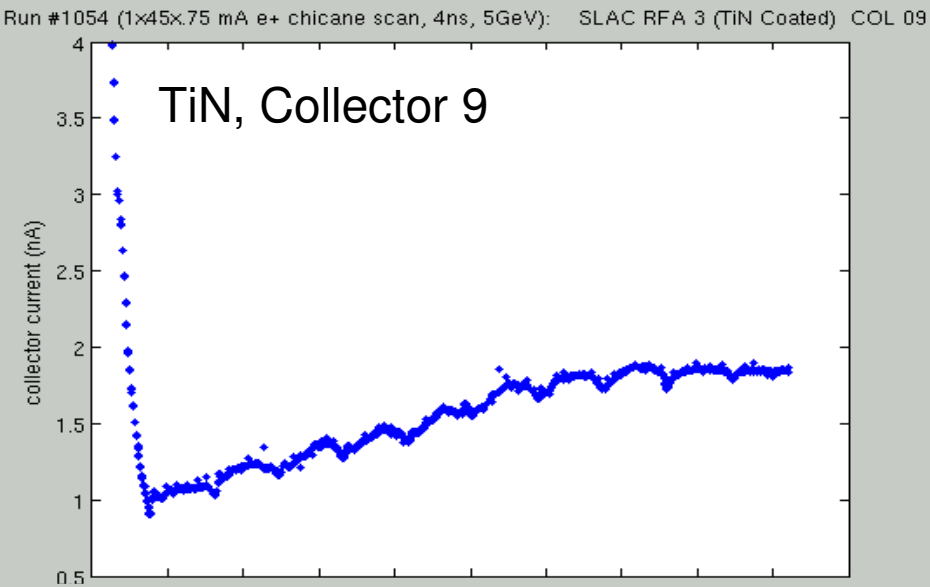


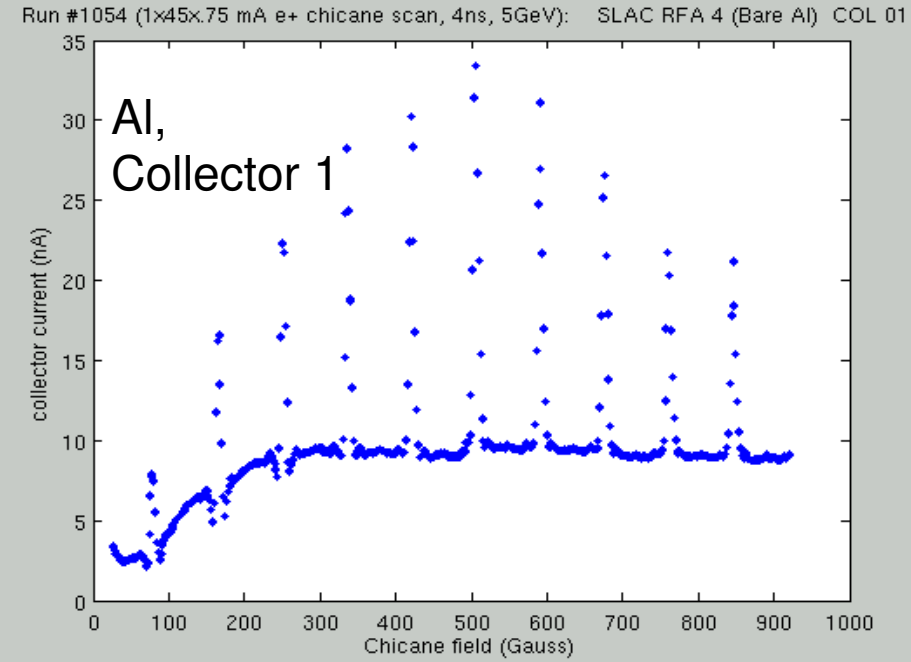


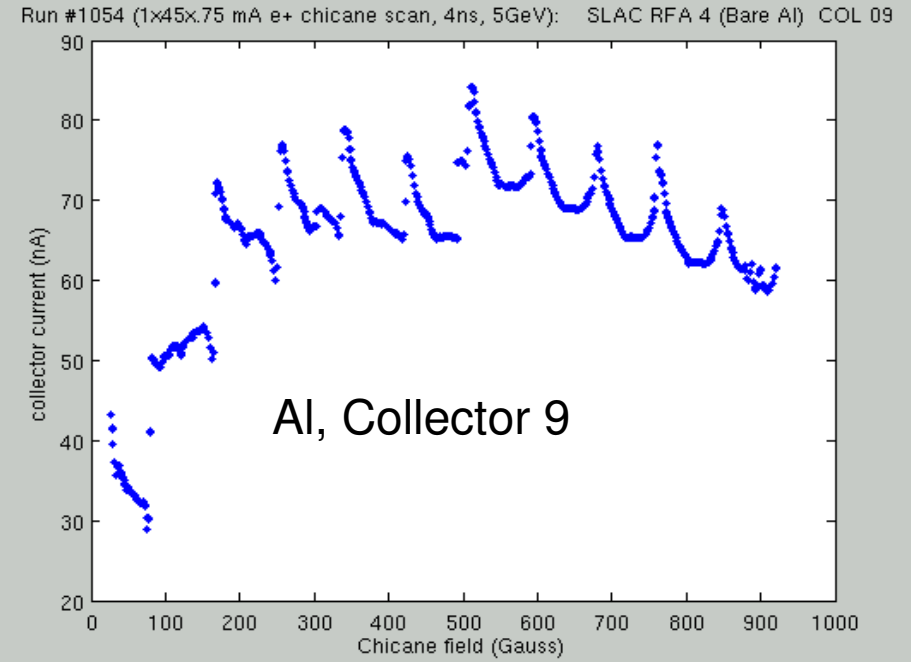


4ns, 5 GeV Chicane Scan

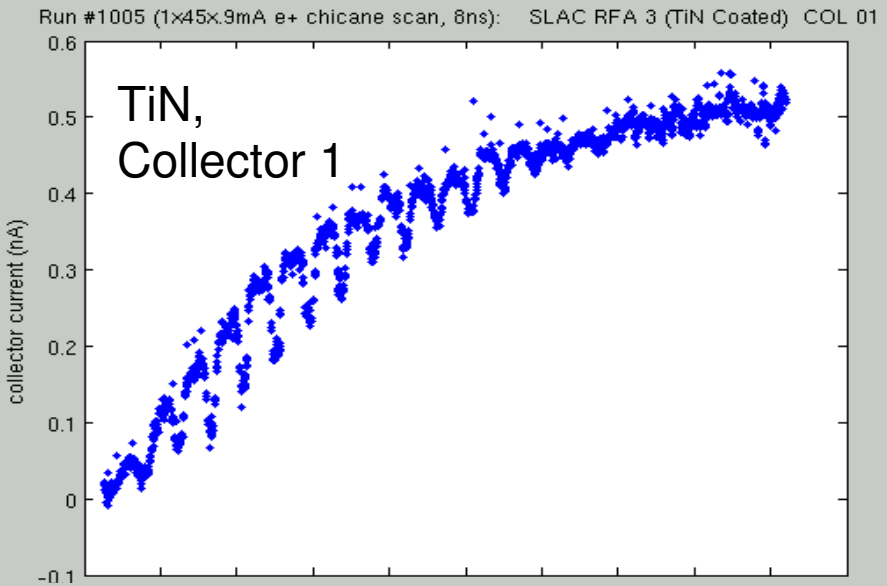


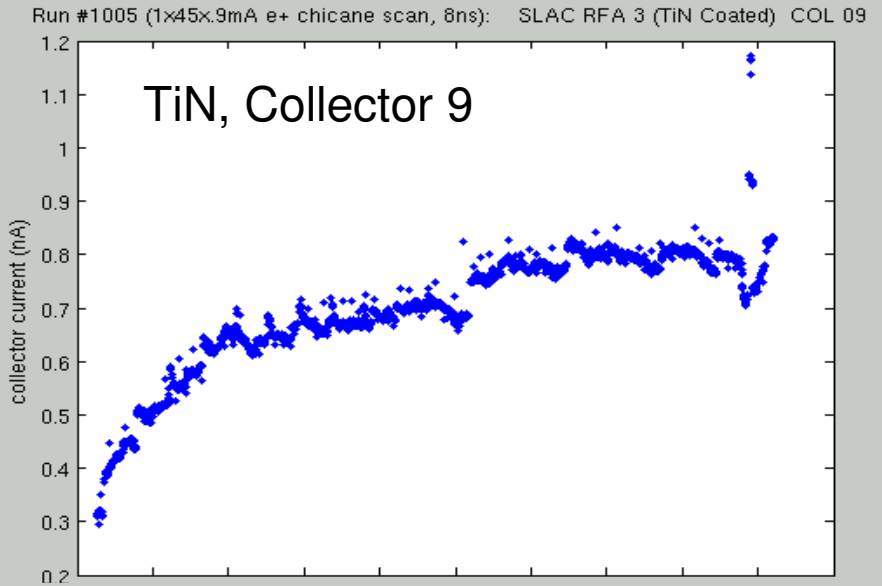


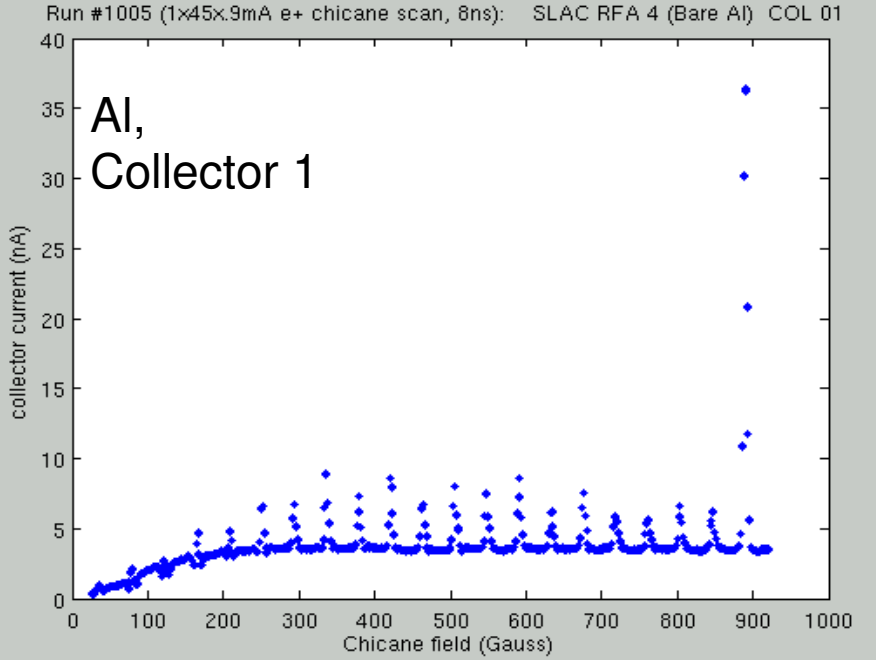


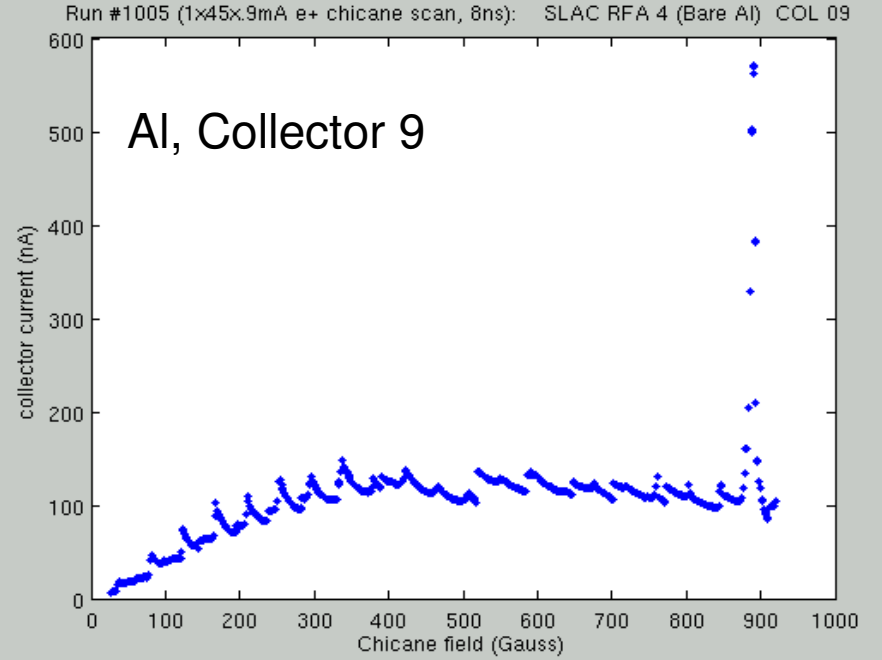


8ns, 2 GeV Chicane Scan

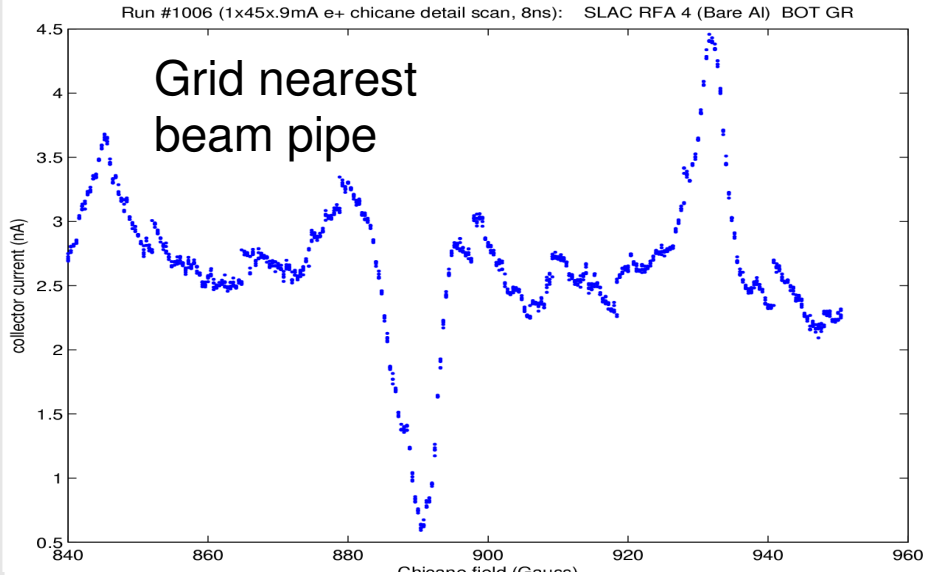


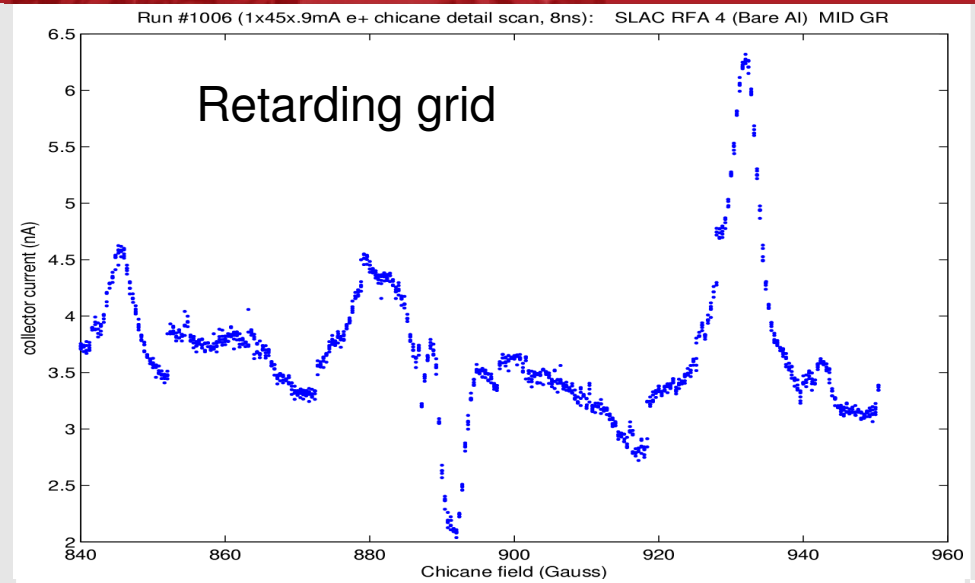


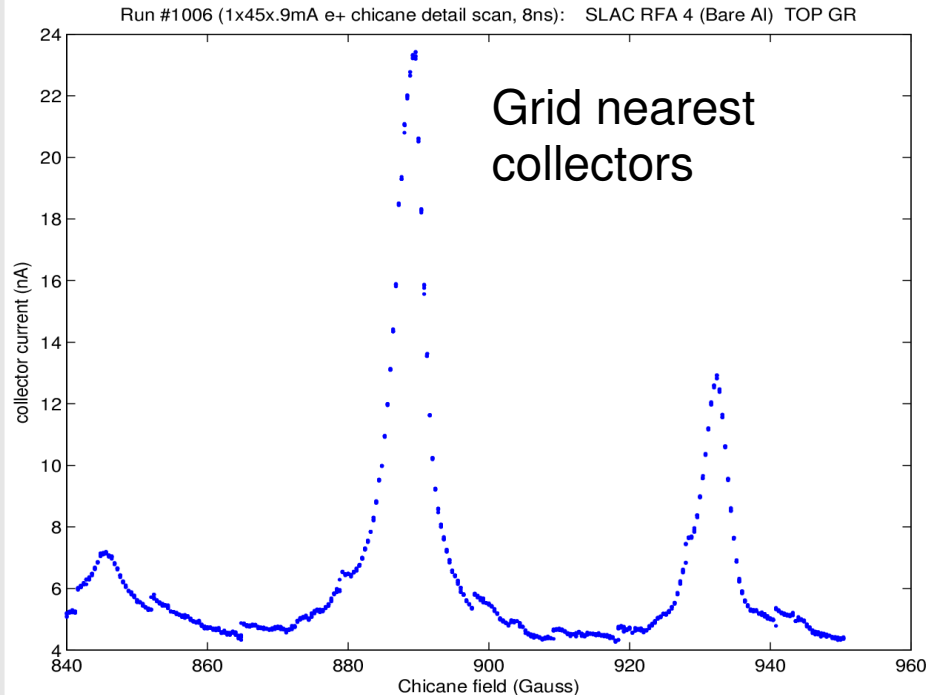


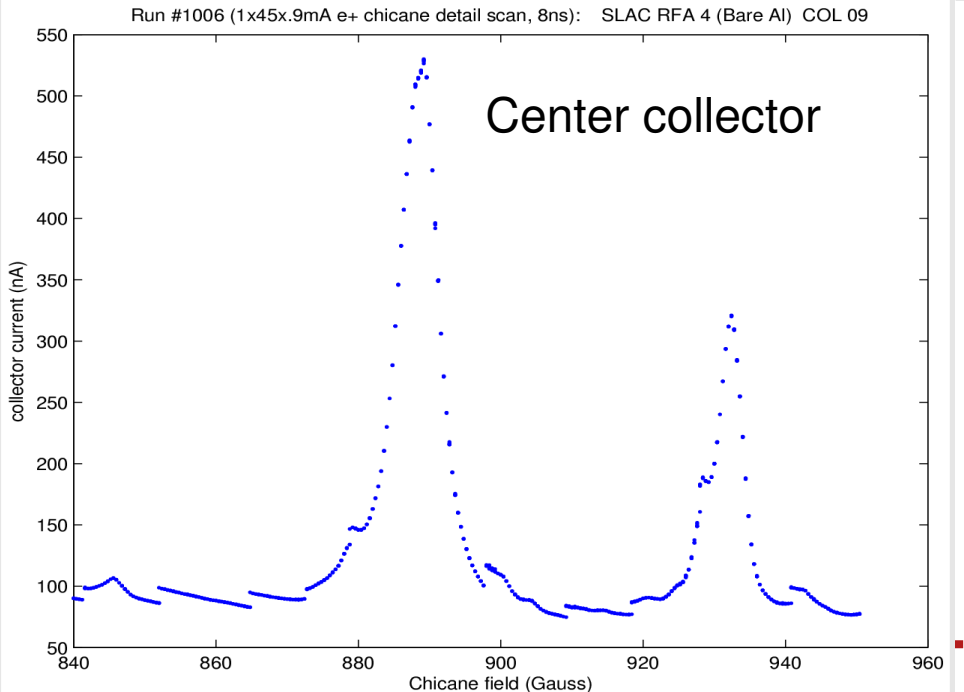


N=20 Resonance

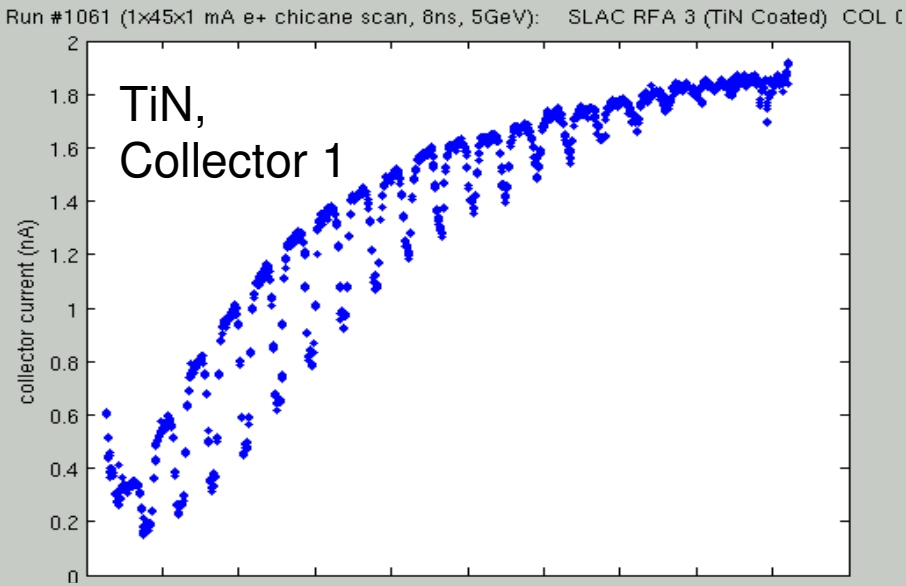


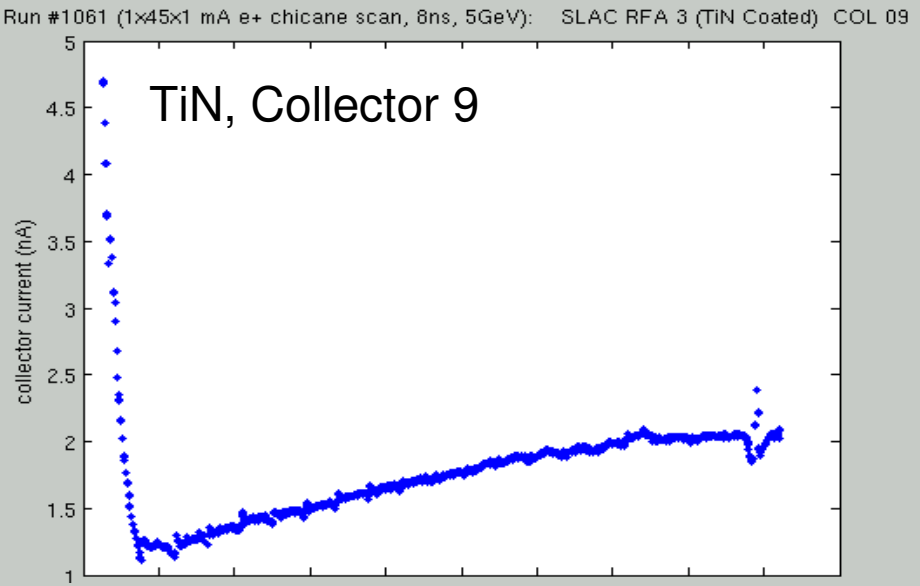


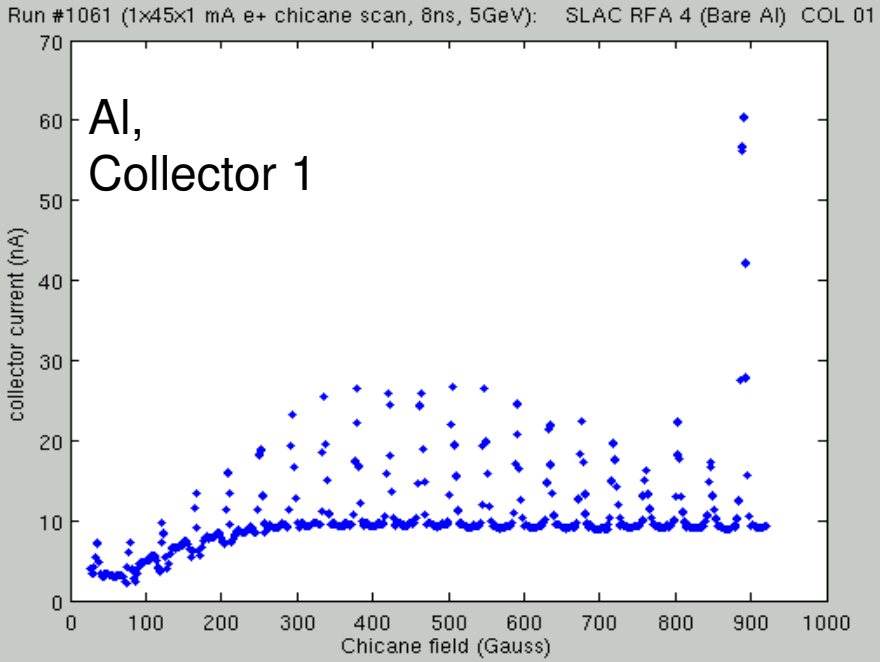


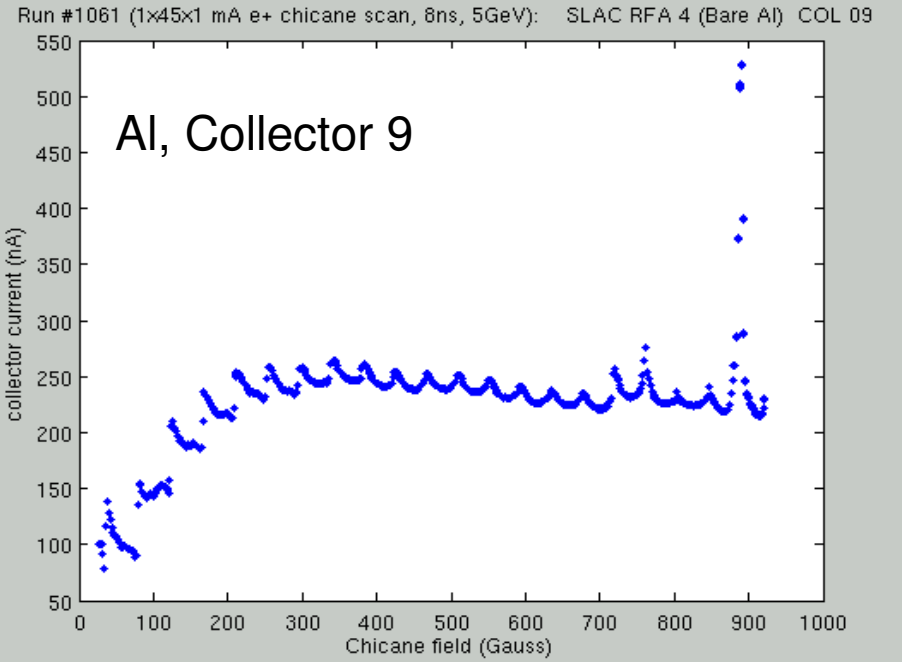


8ns, 5 GeV Chicane Scan

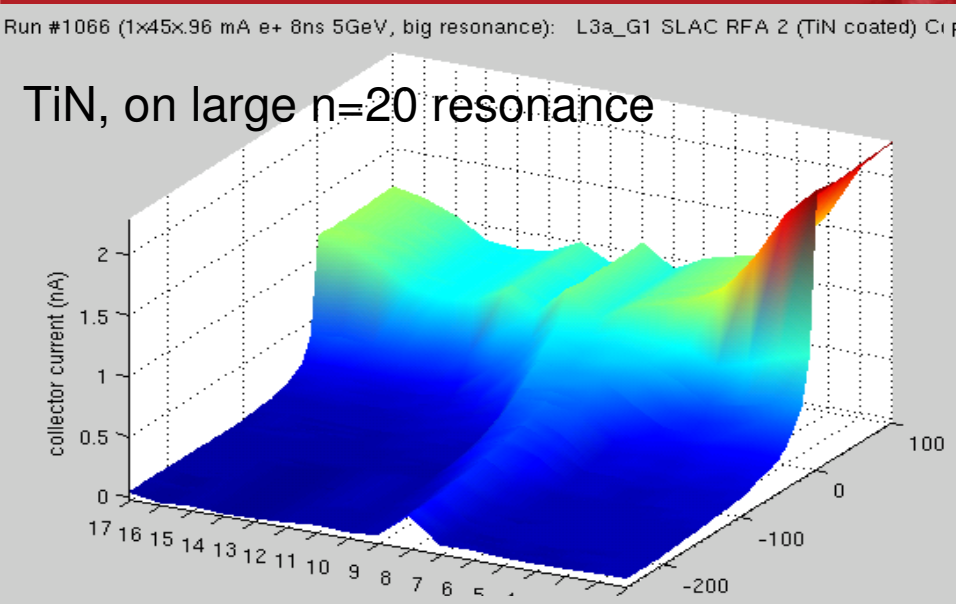


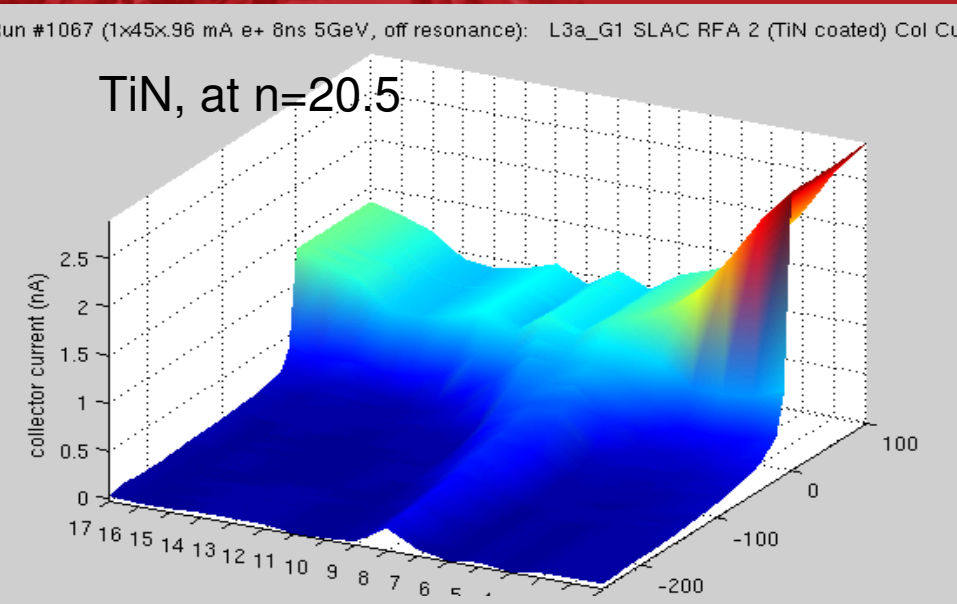


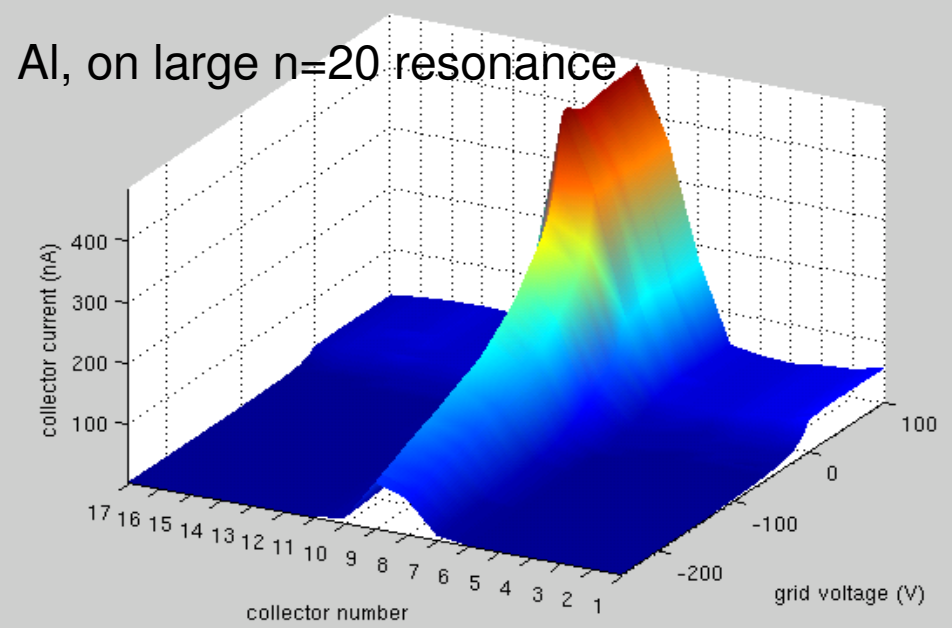


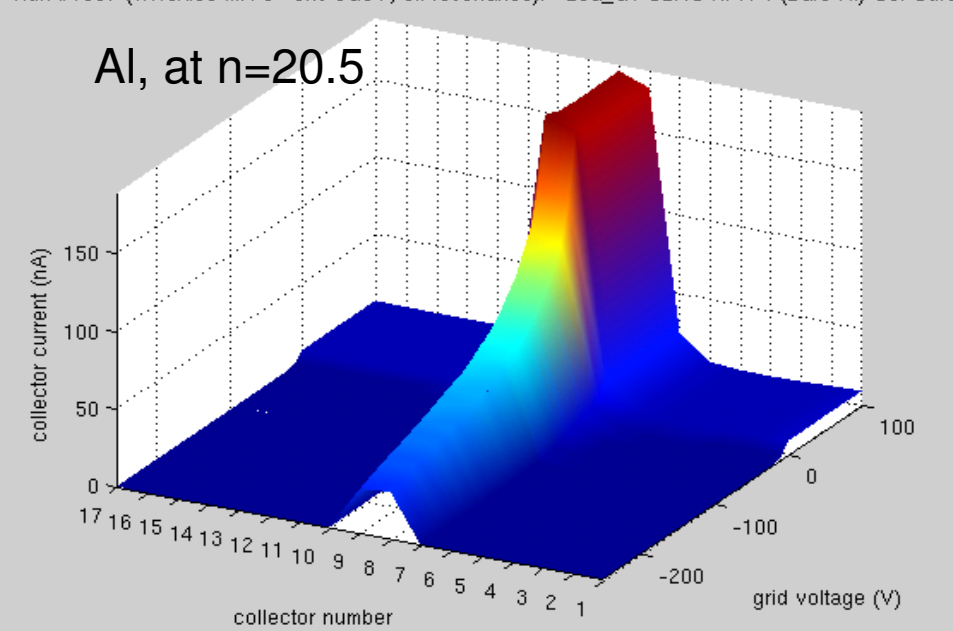


Energy Scan On/Off Resonance





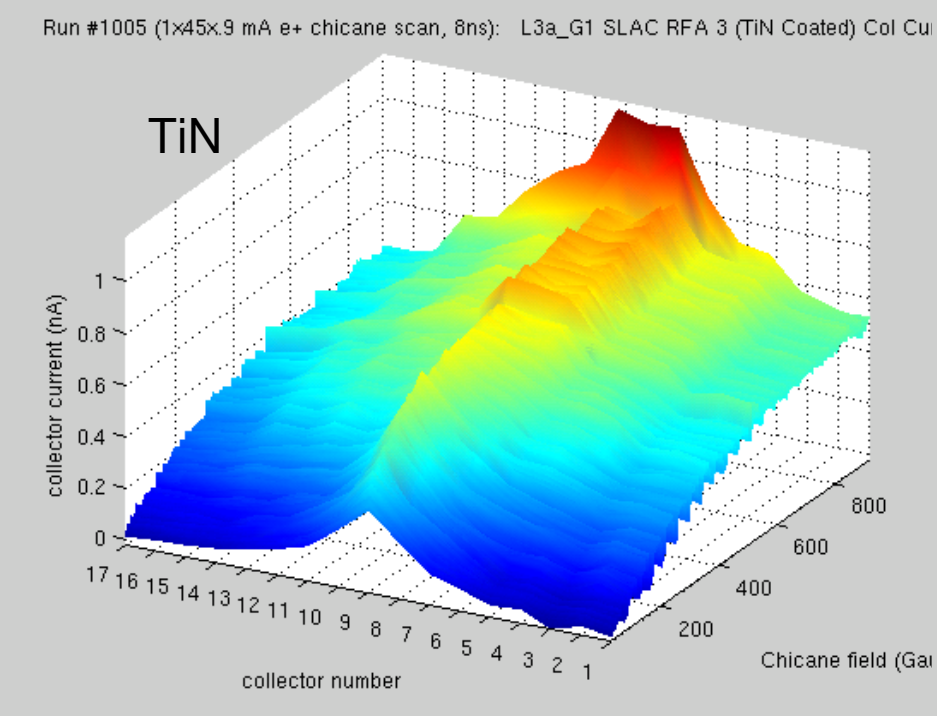


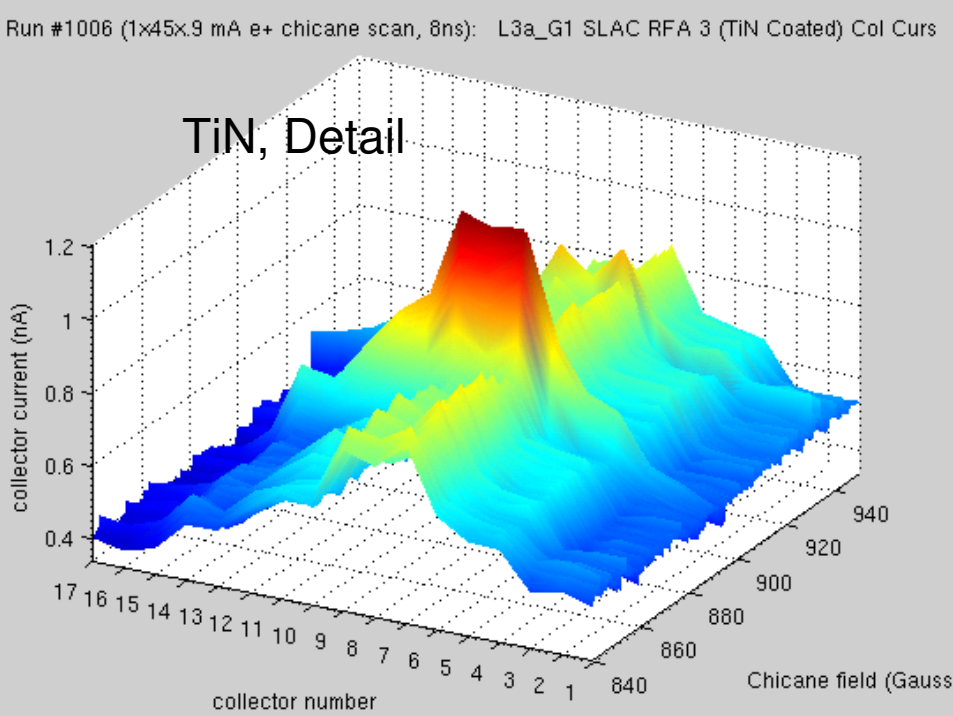


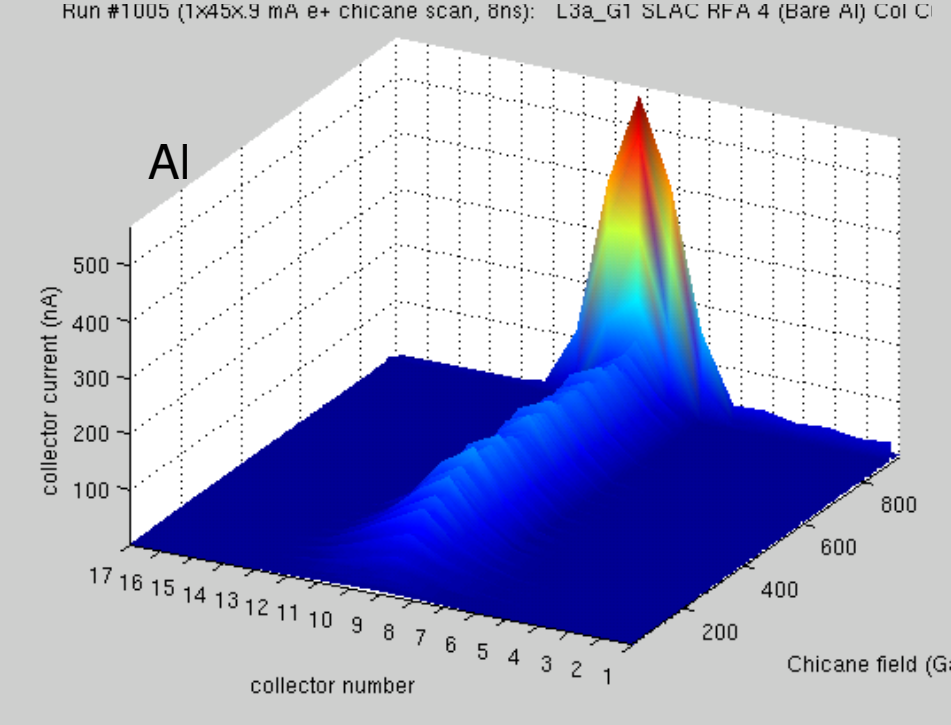
Summary

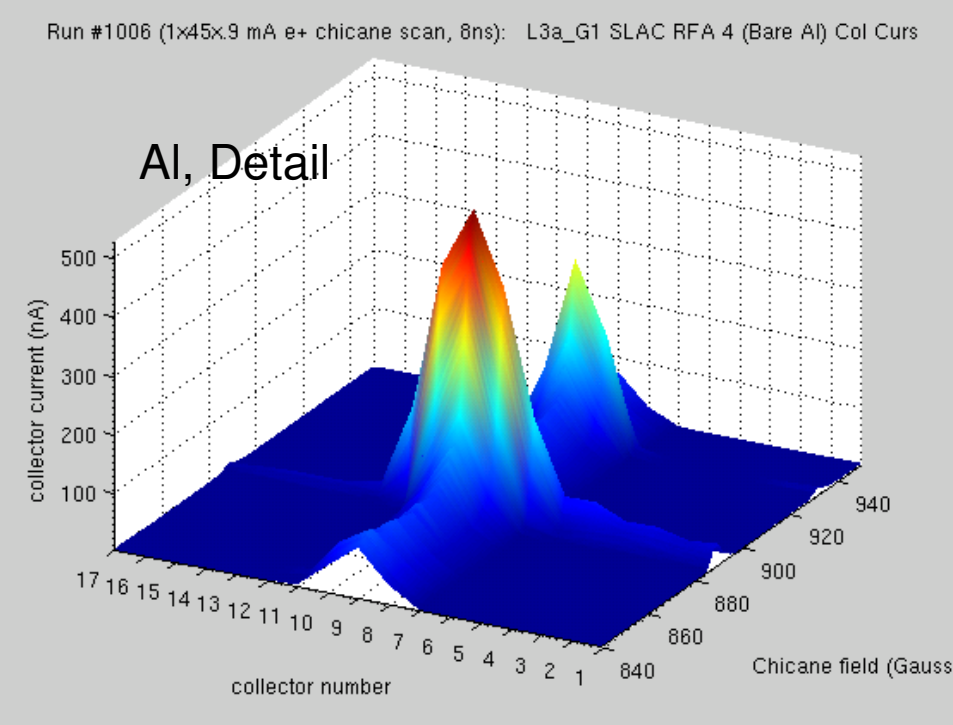
- We have taken data in drifts, dipoles, and wigglers(Joe Calvey).
- We currently have 22 RFA devices installed in CESR, with more to come.
- Commissioning and first data taken with transplanted SLAC chicane.
- More data next run.
- Signs that presence of RFA affects measurements, needs simulation.

Thank you.


Run #1005 (1x45x.9 mA e+ chicane scan, 8ns): L3a_G1 SLAC RFA 3 (TiN Coated) Col Cu
TiN
collector current (nA)
collector number
Chicane field (Ga


Run #1006 (1x45x.9 mA e+ chicane scan, 8ns): L3a_G1 SLAC RFA 3 (TiN Coated) Col Curs
TiN, Detail
collector current (nA)
collector number
Chicane field (Gauss


Run #1005 (1x45x.9 mA e+ chicane scan, 8ns): L3a_G1 SLAC RFA 4 (Bare Al) Col C
Al
collector current (nA)
collector number
Chicane field (Ga


Run #1006 (1x45x.9 mA e+ chicane scan, 8ns): L3a_G1 SLAC RFA 4 (Bare Al) Col Curs
Al, Detail
collector current (nA)
collector number
Chicane field (Gauss

Noise Characterization