SAND2007-5000P

Paraxial Diode Shots on RITS-6

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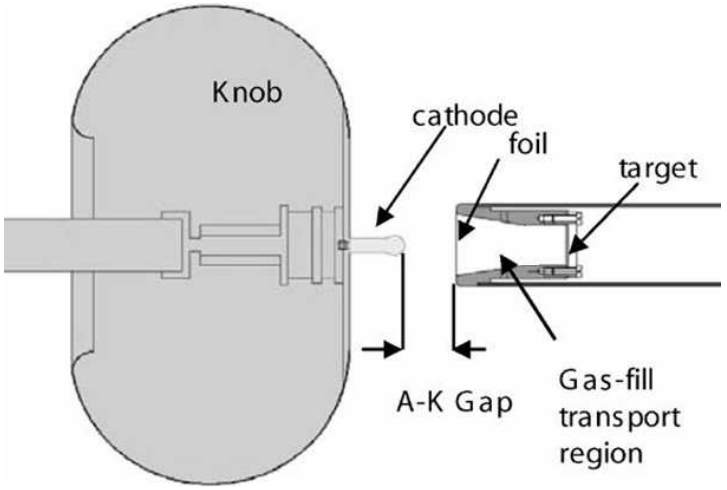
Paraxials on RITS-6 from 2006 to present

Paraxial Diode fielded on RITS-6

- High-Z MITL @ ~9 MV
  - Dose
  - Spot
- Low-Z MITL @ ~7.5 MV
  - Dose
  - Spot



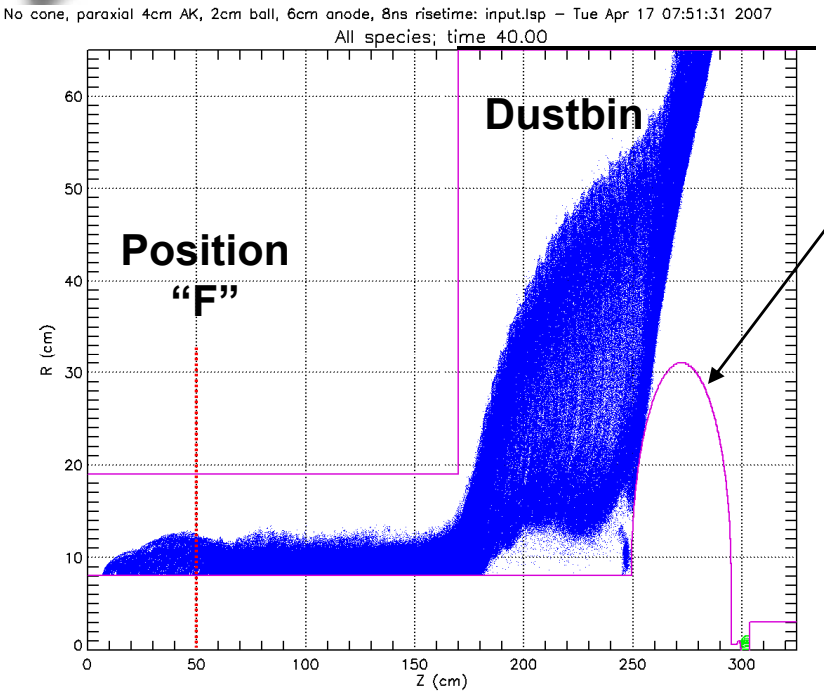
On-going quest

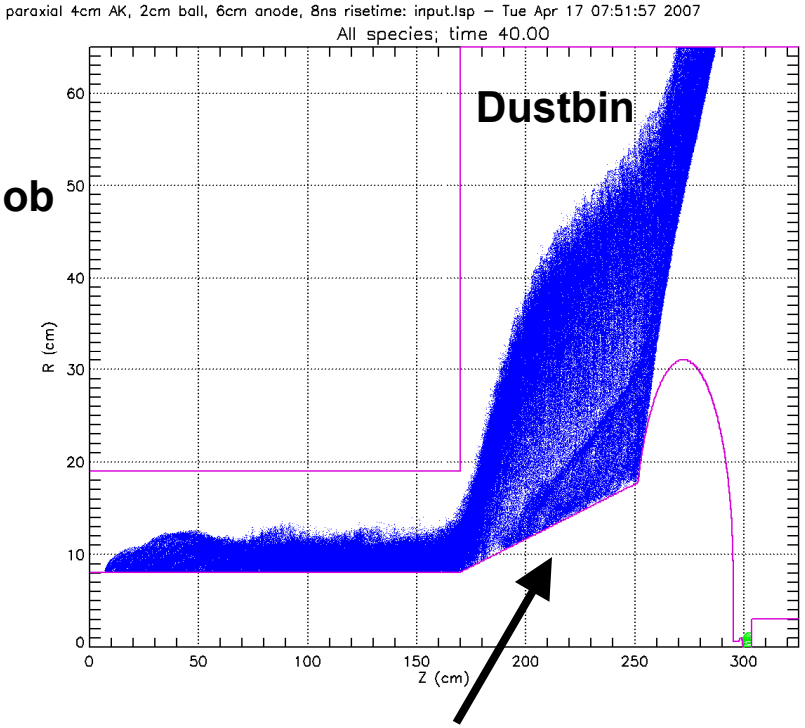
Determine and OVERCOME key limiting factors to achieving a small spot

- Degree of beam sweep, emittance effects, etc.

New(er) Issues on RITS-6 Paraxial Shots:

- 125 MHz Oscillations
- Knob emission (>600 kV/cm)





no cone

Low-Z MITL RITS-6

cone

Low-Z MITL RITS-6

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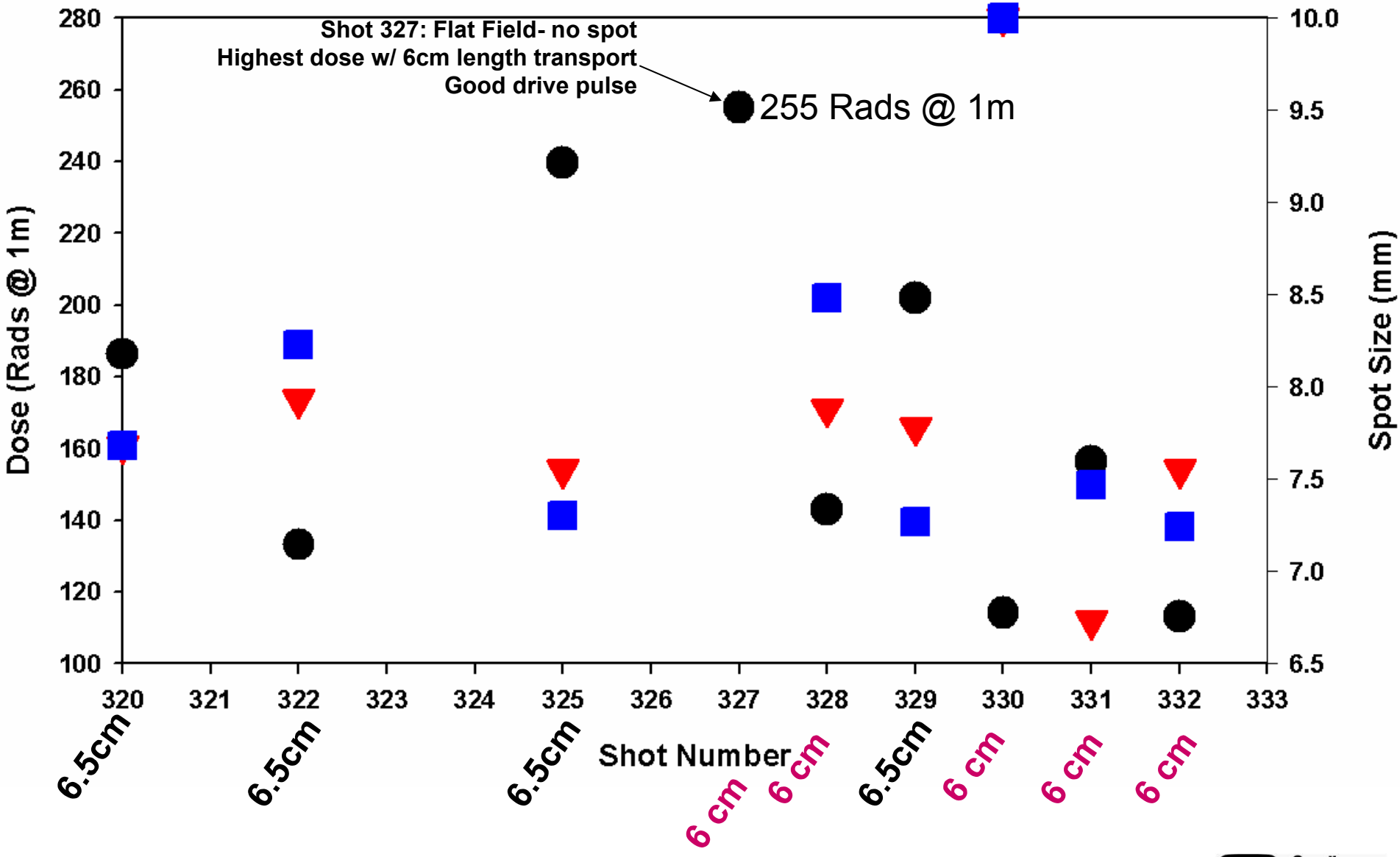
Paraxial Diode Shots on Low-Z RITS-6

- ***April 2007*: ~20 Paraxial Diode Shots on low-Z RITS-6**
  - **7.5 MV peak, 70ns FWHM**
  - **Vary A-K, gas cell length**

- **Main Observations:**
  - **Eliminated emission from knob (~550 kV/cm)**
  - **Max dose range: 200-255 Rads@1m**
  - **Min spot size range: 6.7-7.5 mm (0-100% ESF)**
  - **Observation of significant oscillations in radiation pulse**
    - **125 MHz frequency observed on various I-V monitors**
      - **diode, upstream MITL, AND Cavities #4 - #6 (strongest at #6)**
    - **Appears that ~125 MHz originates in MITL section between Cavities 4 and 6, i.e. we're driving 125 MHz into the dustbin where it is amplified**
  - **Suspect foil ion turn-on late in time for smaller AK gaps (I~40kA+)**

Paraxial Diode Shots: Dose and Spot



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[5] several poor shots due to pulsed power issues

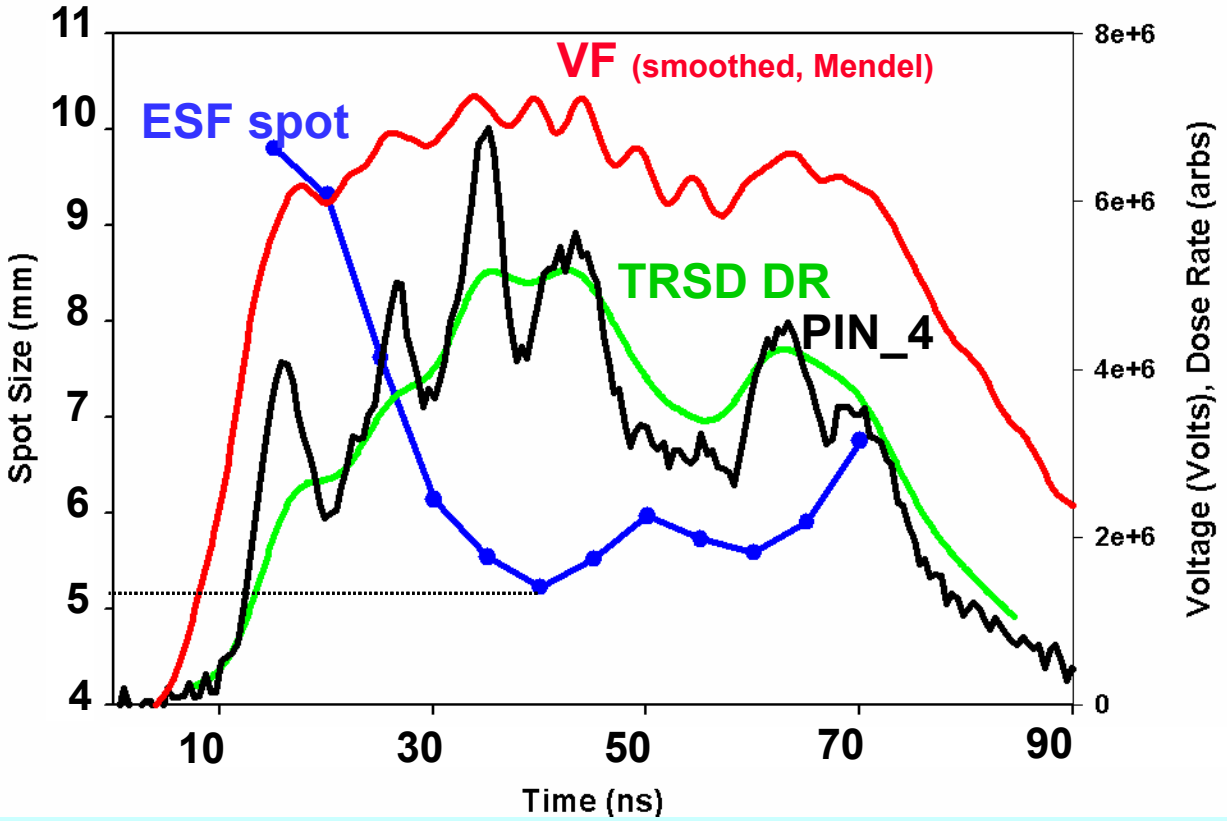
Paraxial Diode Shot 331: Beam Sweeping

Dose: 156 Rads @ 1m
(pulse power issue, lower voltage)

Achieved 255 Rads @ 1m with same setup (flat field for TRSD- no spot measurement)

Time-int Spot:
6.73 / 7.47 mm V/H edge
(0-100% AWE)

NOTE: TRSD cannot temporally resolve 8ns (125 MHz)



Beam sweeps through 5.2 mm minimum spot at peak of radiation pulse

Note ~125 MHz oscillations on radiation pulse

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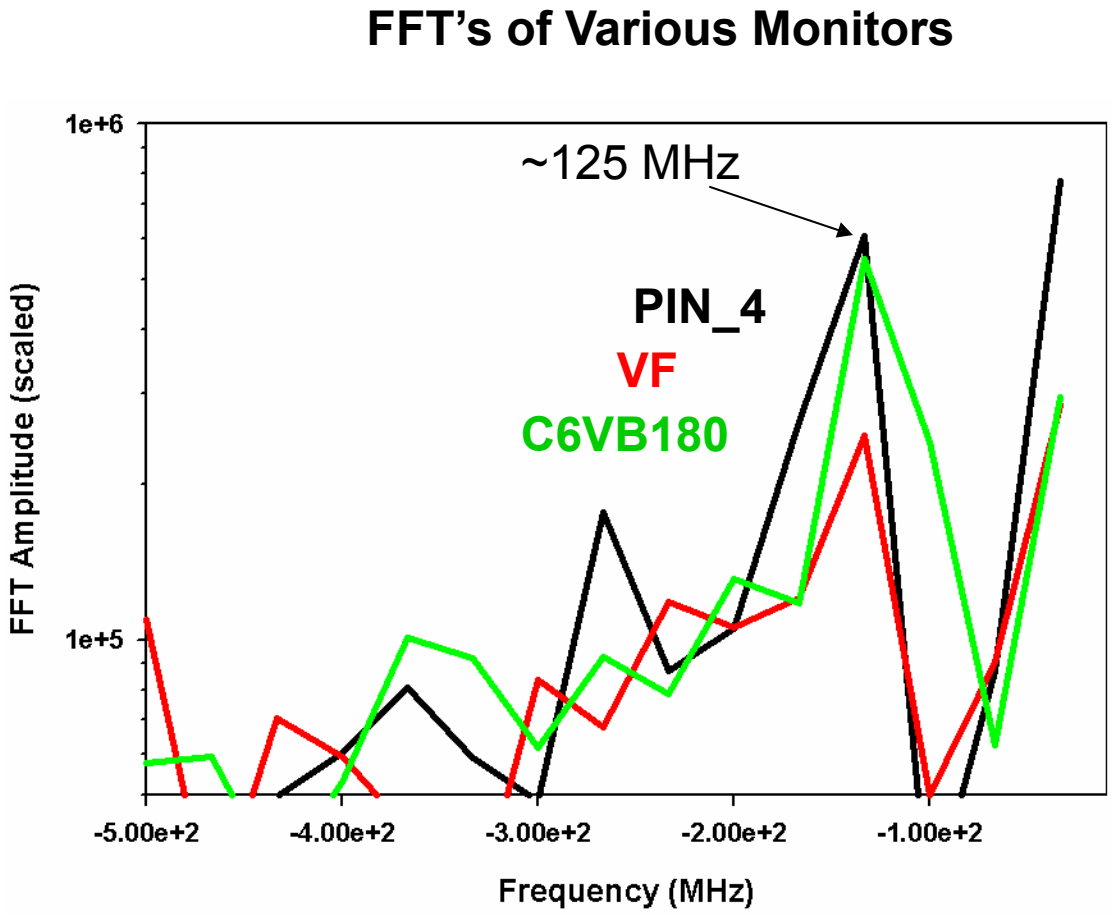
Paraxial Diode Shot 331: 125 MHz

Note: *125 MHz frequency is observed on B-dots and D-dots in diode, upstream MITL, and Cavity (#4-6) regions.*



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On-going work

- Future work on low Z MITL:
  - Would like to fill in dataset with improved pulsed power (for dose)
    - Vary gas-cell lengths to distinguish beam sweep effects
    - Vac-cell shots
- Future work on high Z MITL
  - Based on performance on low-Z MITL, we believe we will be able to scale up to higher (10+MV) voltages
  - Assess beam sweep (vary gas cell length, pressure, AK, etc),
  - Characterize beam (emittance measurement, spectroscopy, time-resolved imaging)
  - Spectroscopy in gas cell
  - Plasma-filled paraxial diode