Avoiding Preheat in a Warm Dense Matter Experiment

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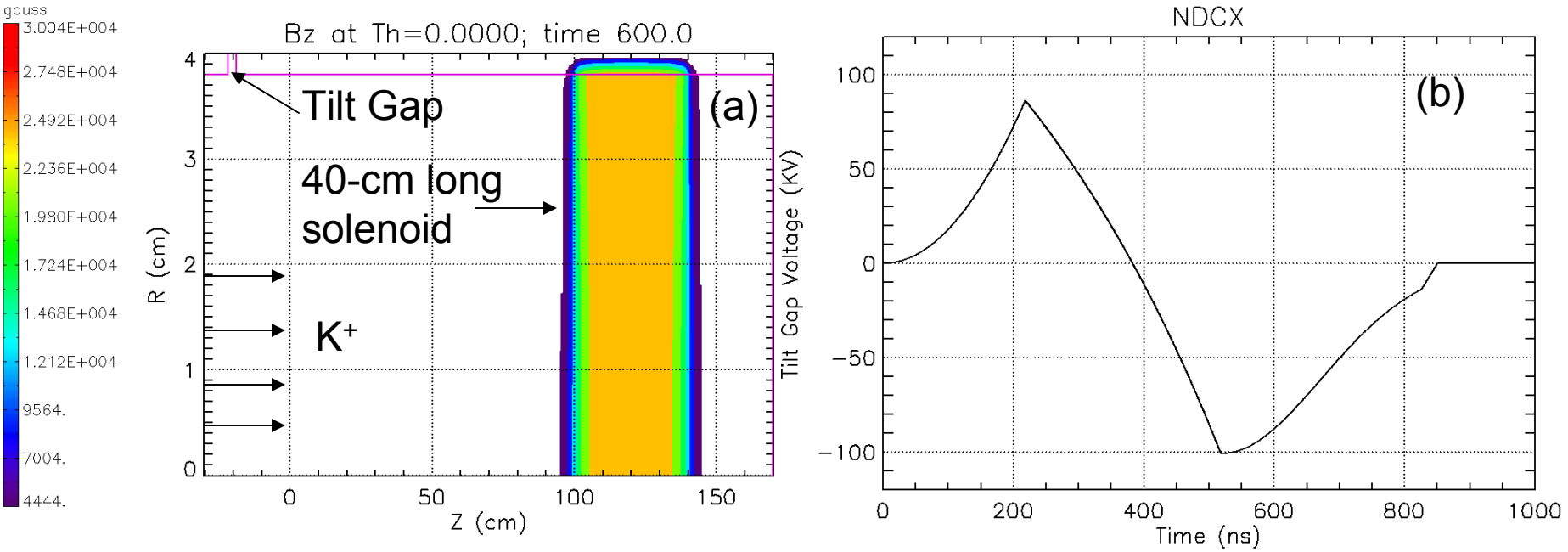
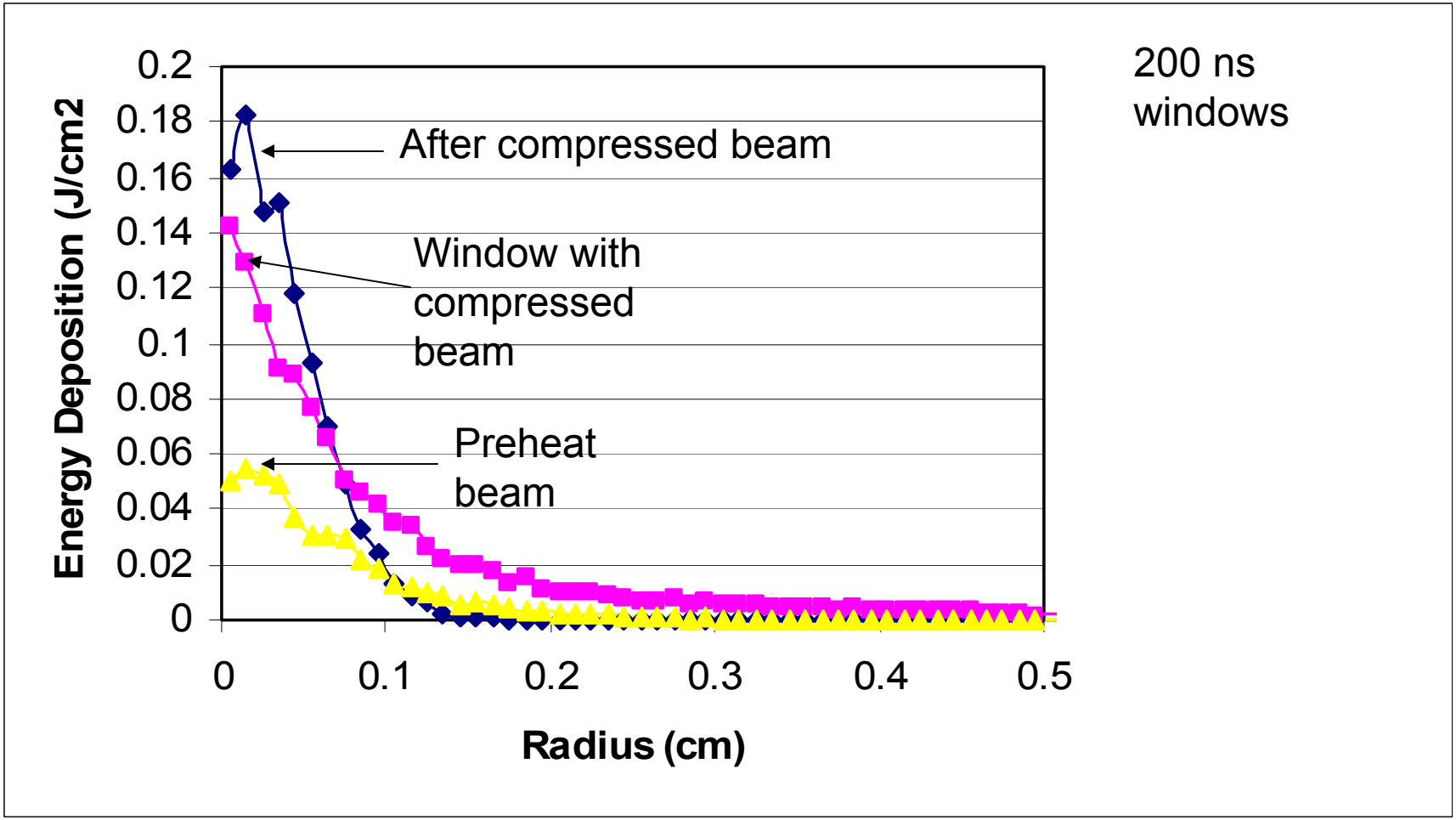
NDCX with ideal plasma, 3 T field

- EM simulation of beam drift compression in 3-eV, 10^{13} cm^{-3} He tensor σ starts at z=-5 cm
- 1.9-cm, 8.5 and 19 mr, 400 keV mean energy, 50 mA, 300 ns, .21-eV source, K^+ pulse – ideal tilt gap waveform



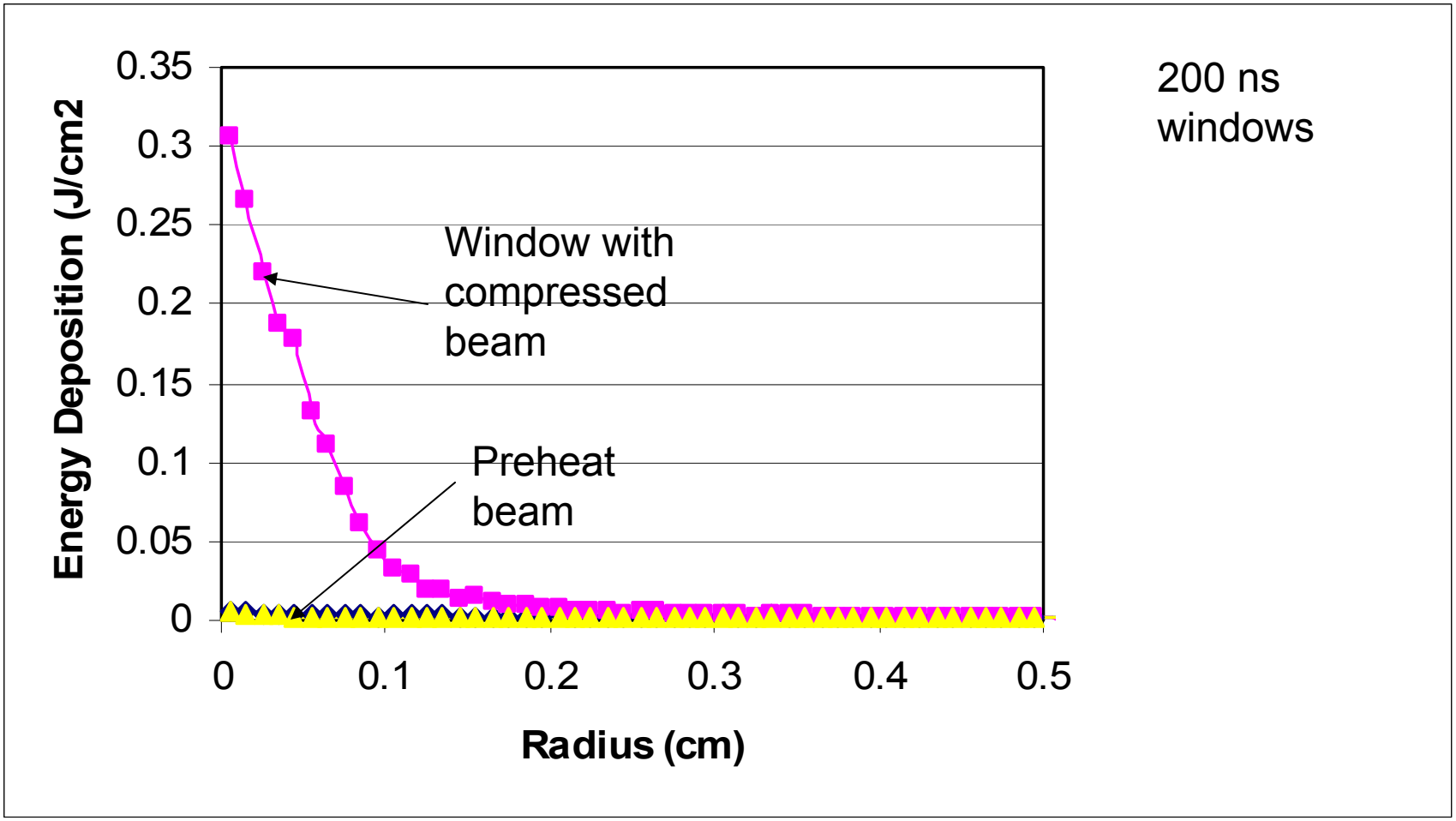
Nominal focus gives terrible contrast

- Beam given a 8.5 milliradian angle, compressed portion of beam reaches solenoid with a 1.5 cm radius
- Focus tighter for uncompressed beam, terrible contrast



Over focus of beam

- Beam given a 19 milliradian angle – uncompressed beam focuses before solenoid
- Beam tightest at axial compression, contrast excellent
- Should be able tolerate 1 microsecond pre-pulse



Overfocus technique easier at smaller beam energies

- Large rise rate of tilt voltage, long transit time across gap results in defocusing of compressing portion of beam which must be compensated with a steeper incoming angle
- Early uncompressed beam focuses before solenoid, larger radius at target
- Compressing portion of beam reaches solenoid at smaller radius, producing tighter focus and better contrast