Wire initiation critical for radiation symmetry in Z-Pinch driven Dynamic-Hohlraums

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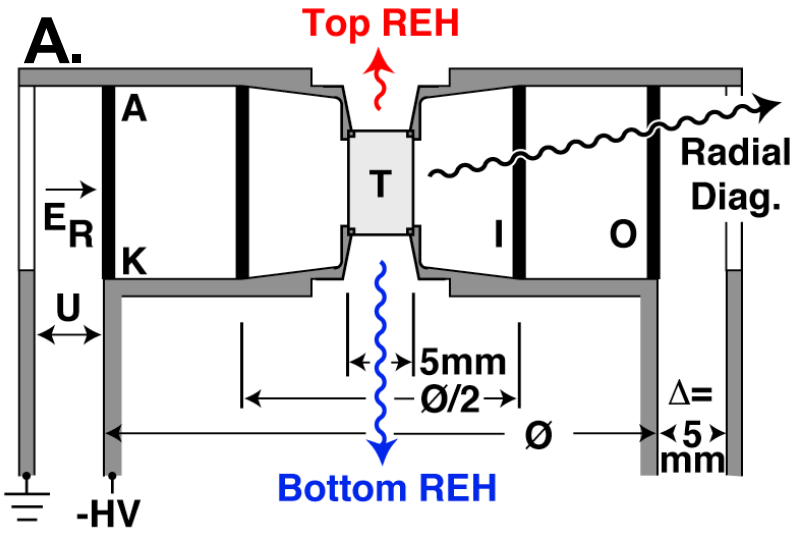
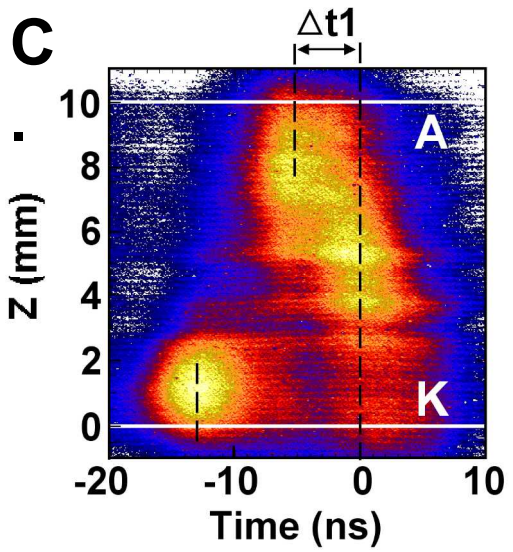
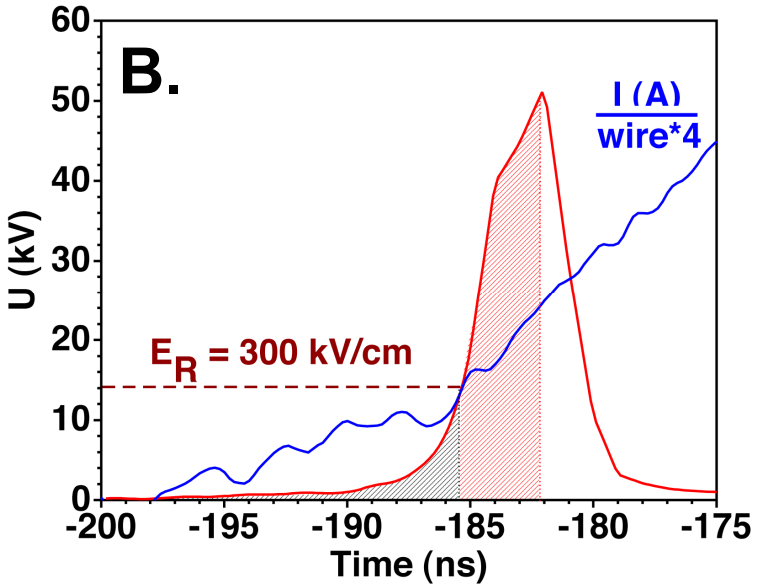
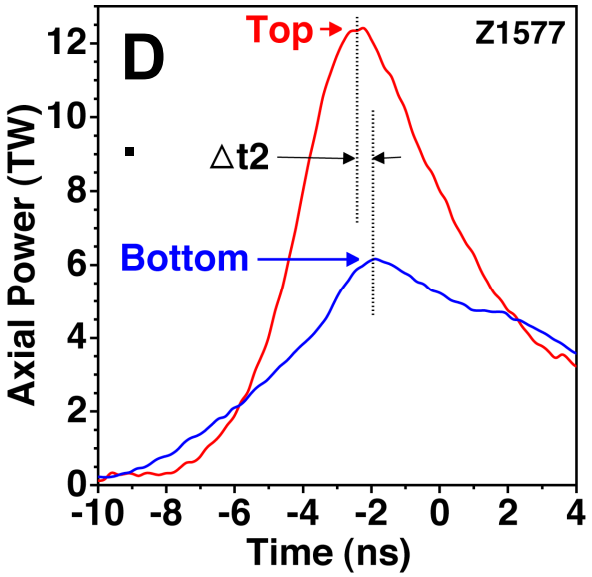
Axial zippering at target leads to further axial radiation asymmetry.

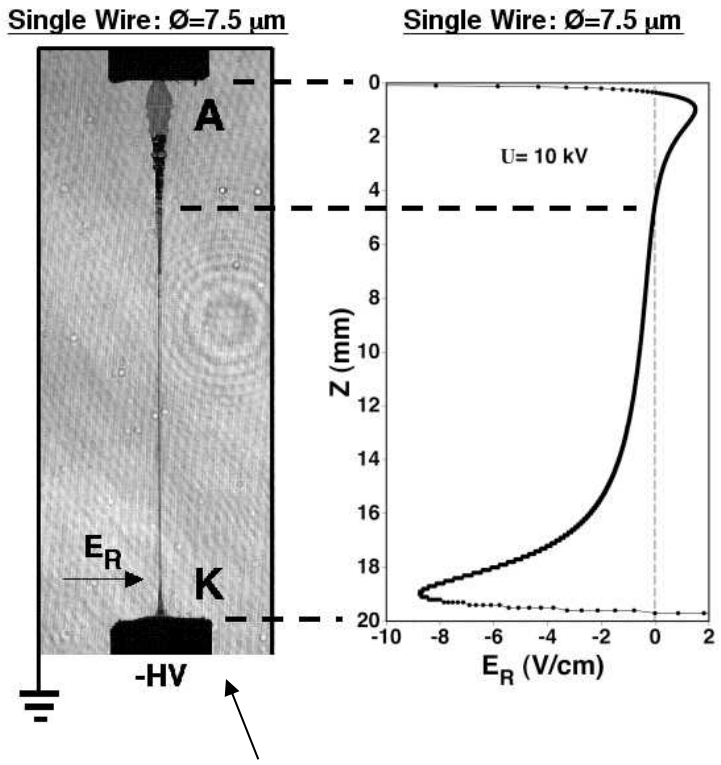


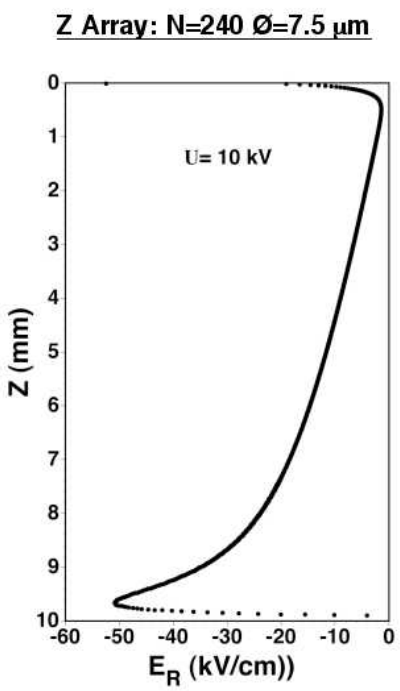


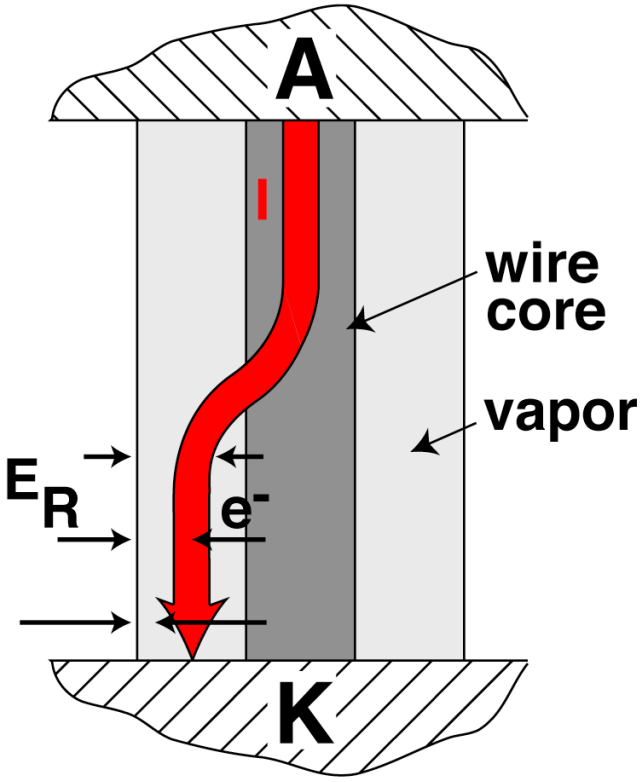




Radial electric field E_R modulates current shunting in wires.

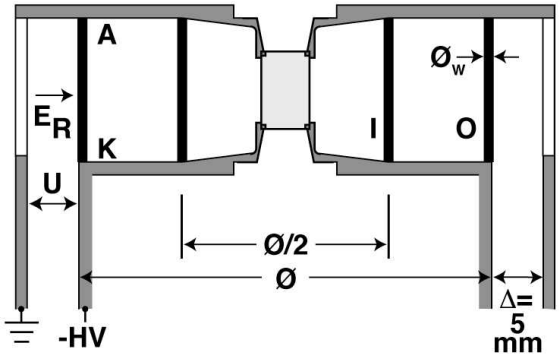




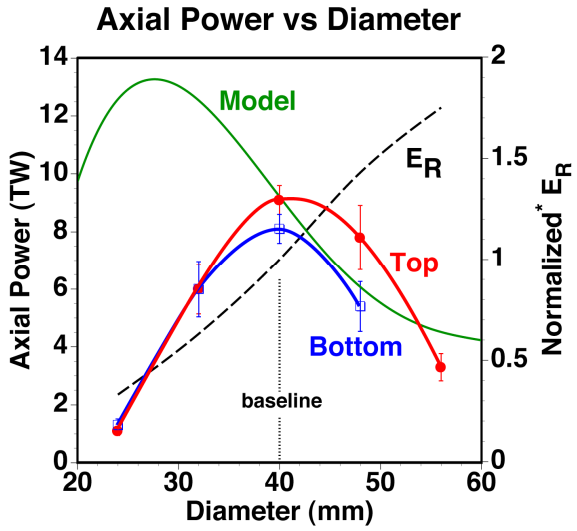


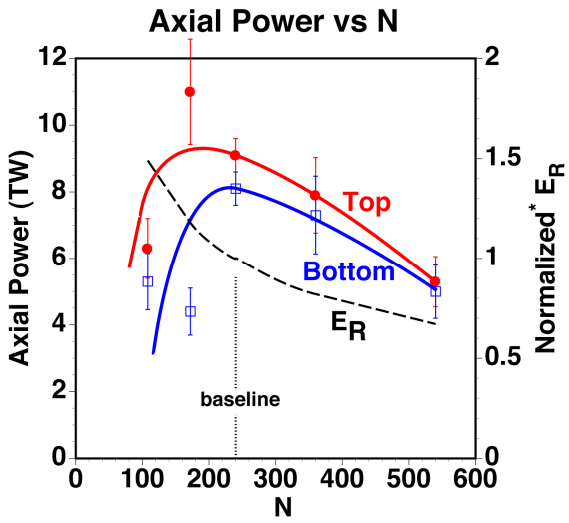
G. Sarkisov, etal, Phys. Rev. E **66**, 046413 (2002)

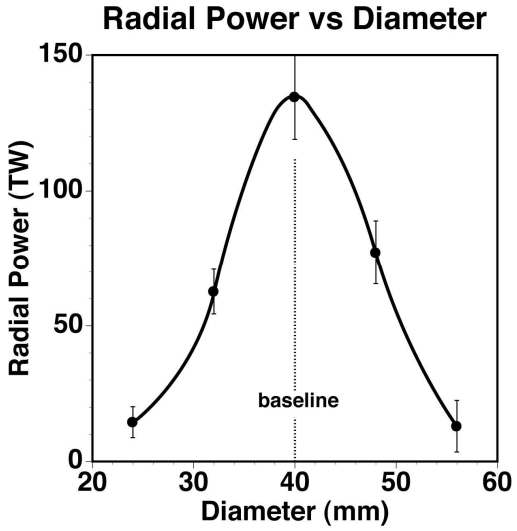
Top / bottom axial power asymmetry increases with E_R.

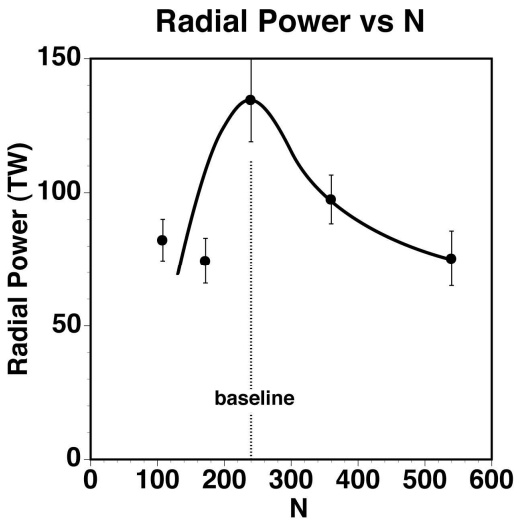


$$E_R = \frac{U}{2\Delta} \cdot \frac{Ø}{Ø_w N}$$









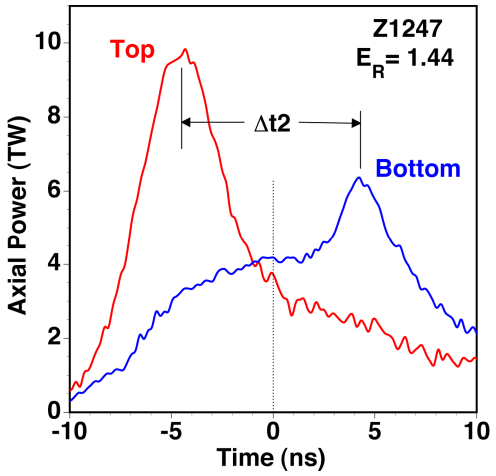
* E_R normalized to baseline E_R

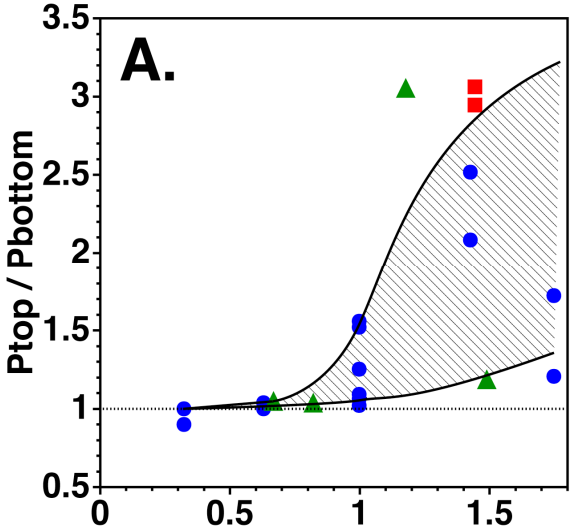
Data suggests keeping radial electric field E_R below ~0.8 for axially symmetric implosion.

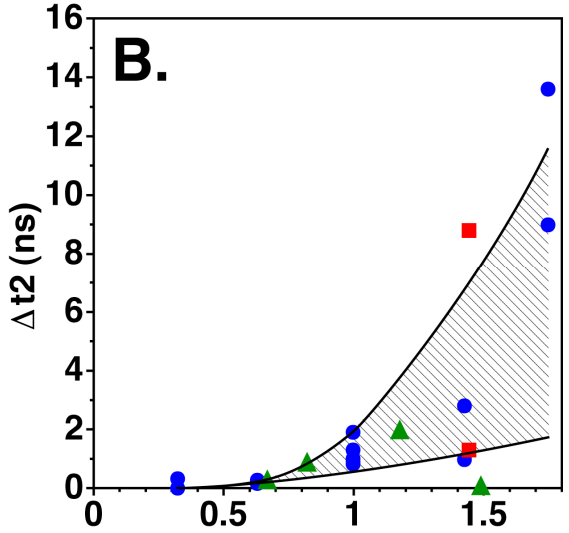
Table I. Outer wire array parameters.

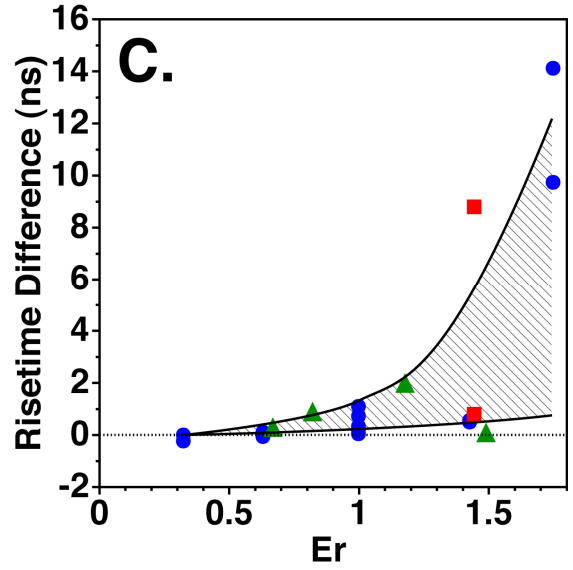
Symbol	Array Ø (mm)	N	Wire Ø (μm)	Er
●	56	288	5	1.75
	48	240	6.3	1.43
	40	240	7.5	1
	32	256	8.9	0.63
	24	332	10	0.33
■	40	240	5.2	1.44
▲	40	108	11.2	1.49
	40	172	8.9	1.18
	40	360	6.1	0.82
	40	540	5	0.67

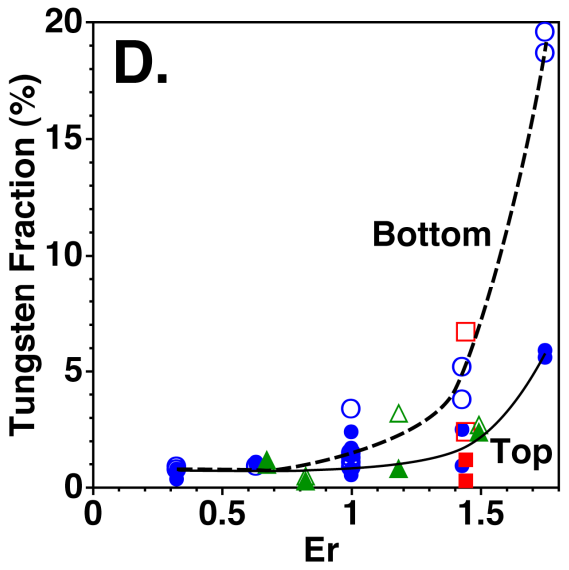
Reverse-mass configuration











Simulated time difference of zipper Δt1 is in agreement with measured difference.

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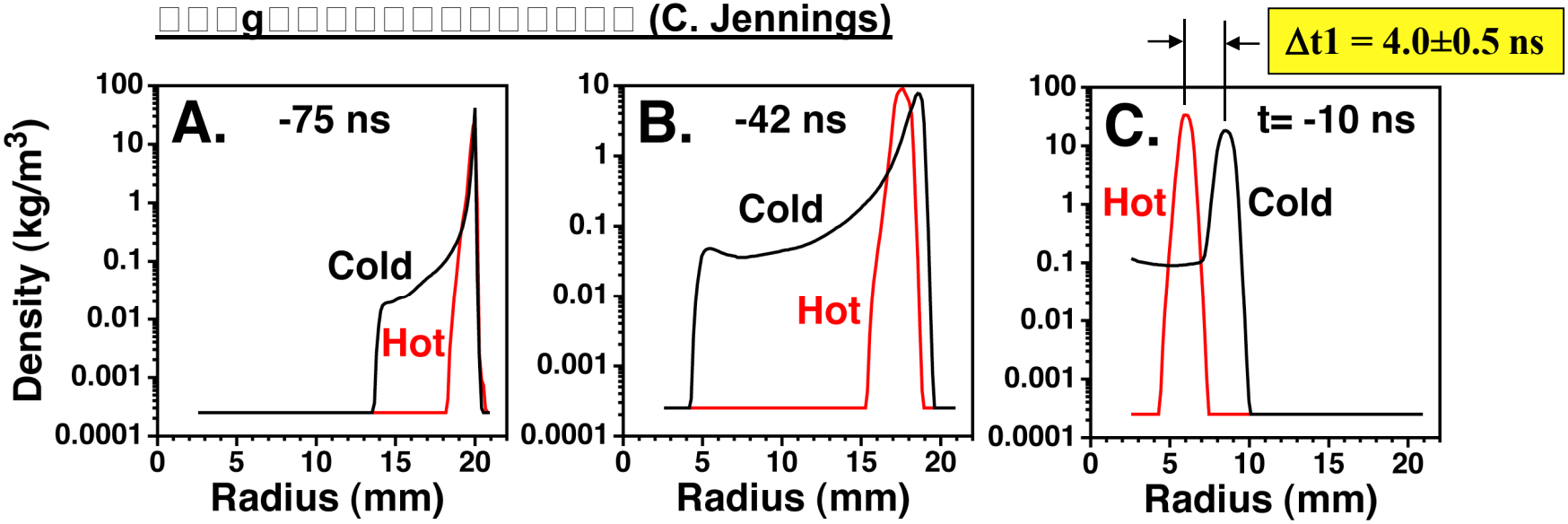
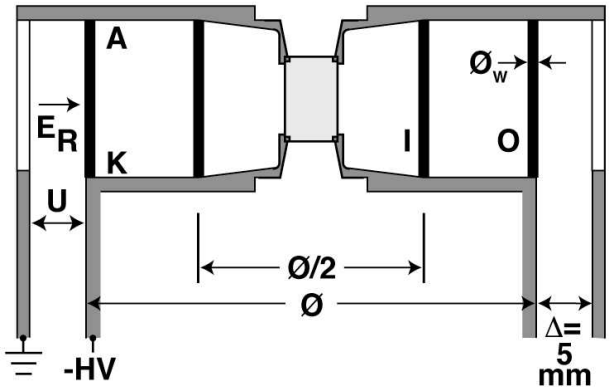
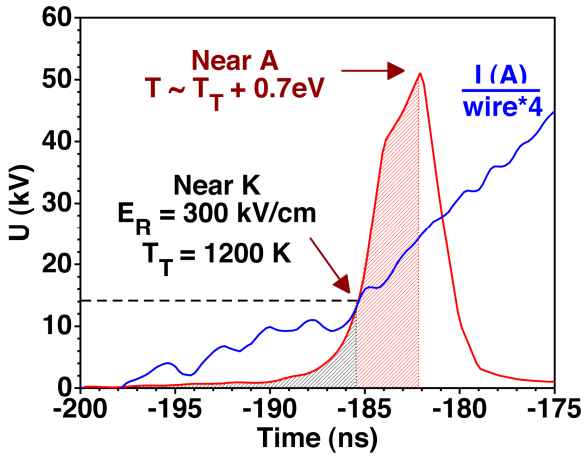
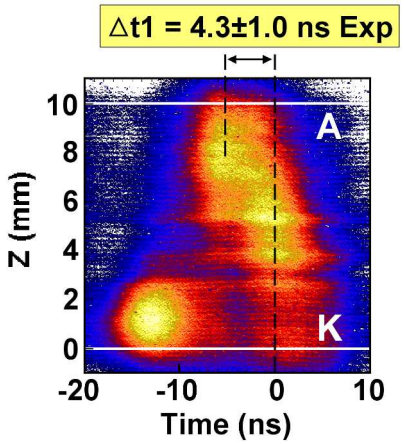




AK voltage (S. Rosenthal)



X-ray streak camera image



Summary

- ☺ The axial radiation asymmetry can be controlled by the axial uniformity of the initial energy deposition into the wires, which in turn is regulated by the magnitude of E_R along the outer array wire surface.

- ☺ The data suggests the asymmetries are minimized by maintaining good current contact between the wires and the electrodes and by keeping E_R low.