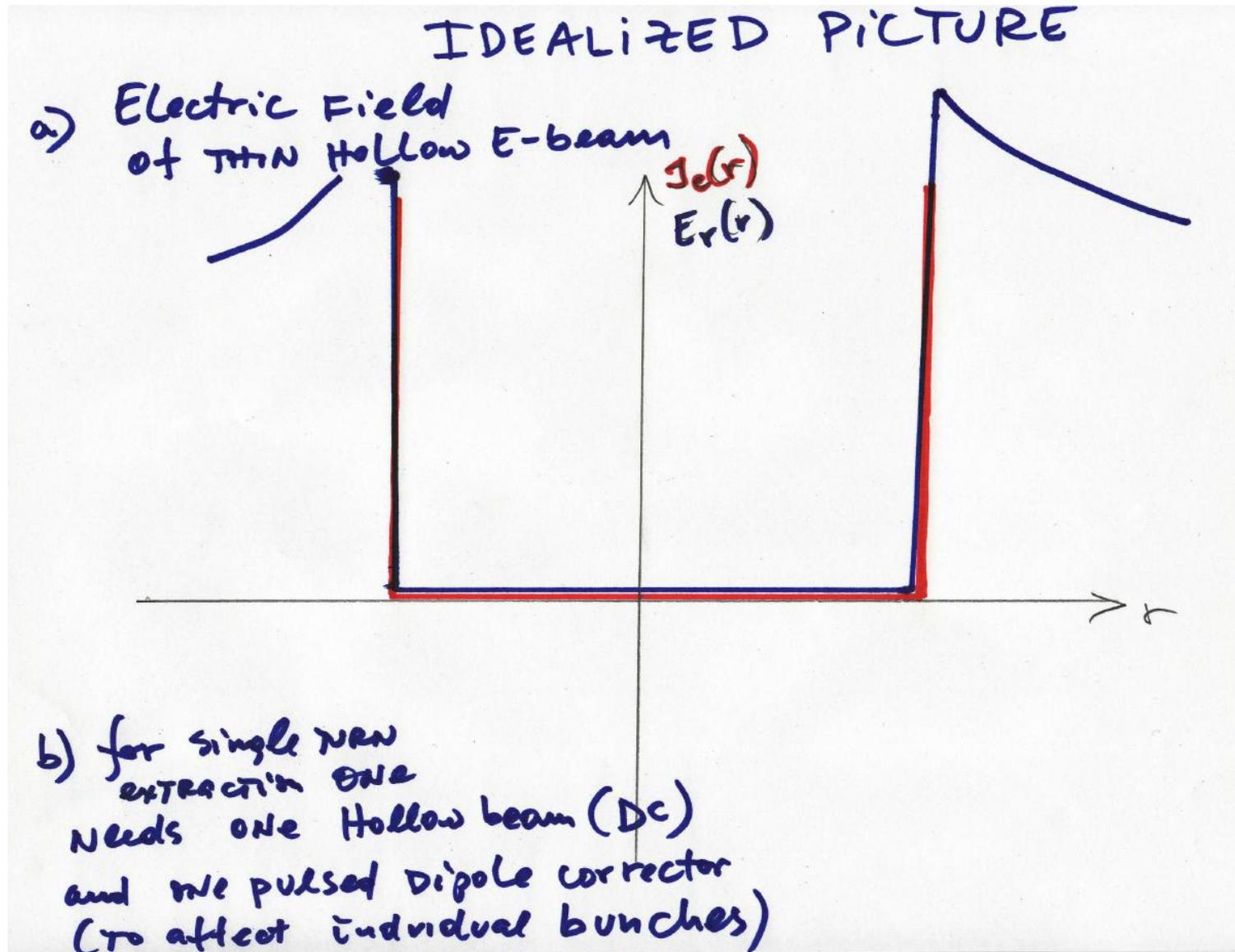


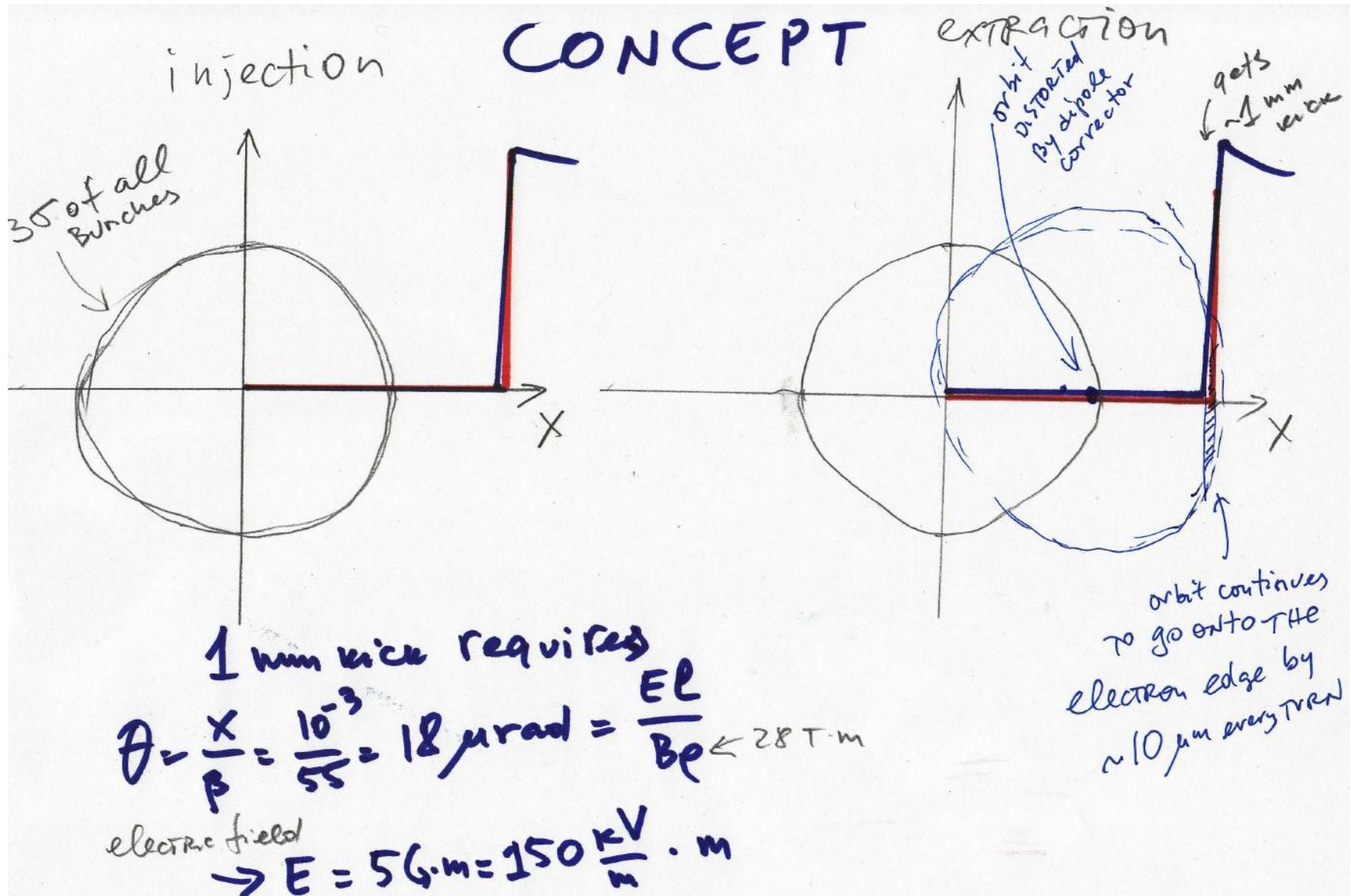
On single-turn slow extraction from individual bunches

V.Shiltsev 9/27/2011

Hollow Electron beam (like in TEL now)

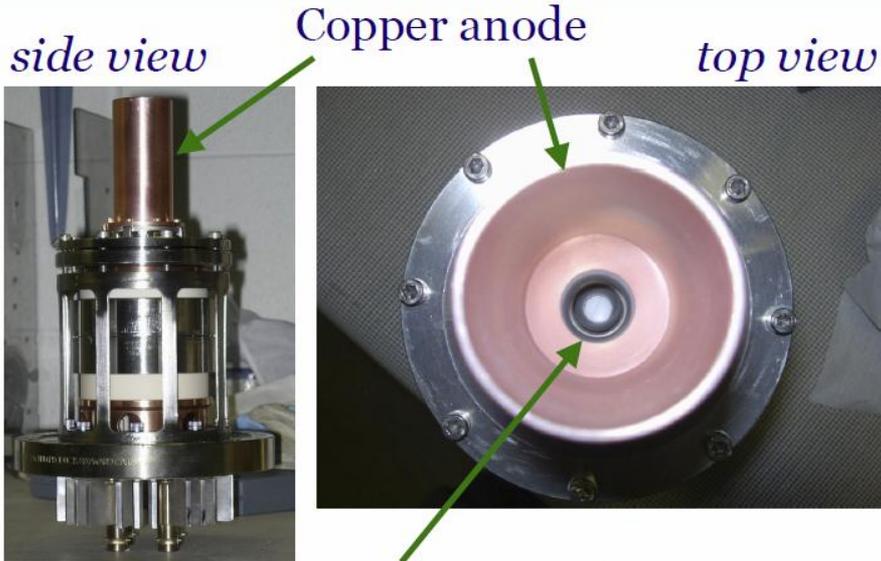


How to use that for extraction

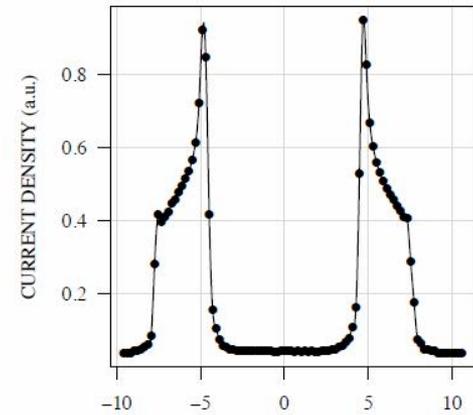


How Hollow Electron beam system looks in Tevatron (from G.Stancari)

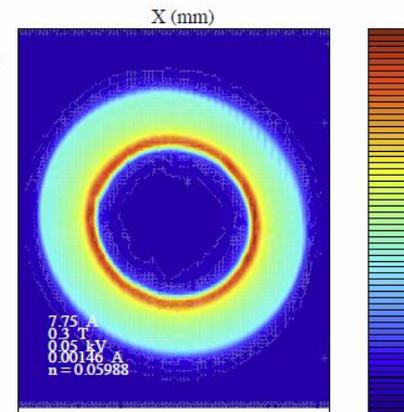
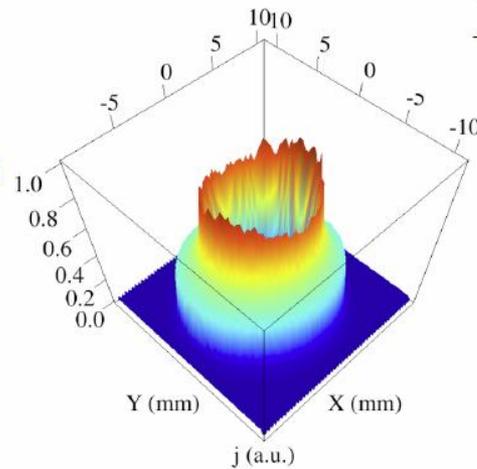
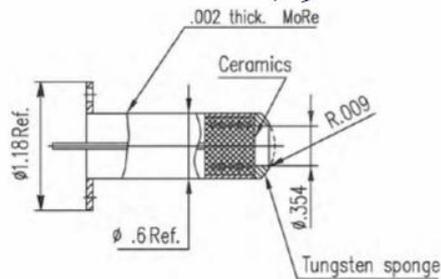
The 15-mm hollow electron gun



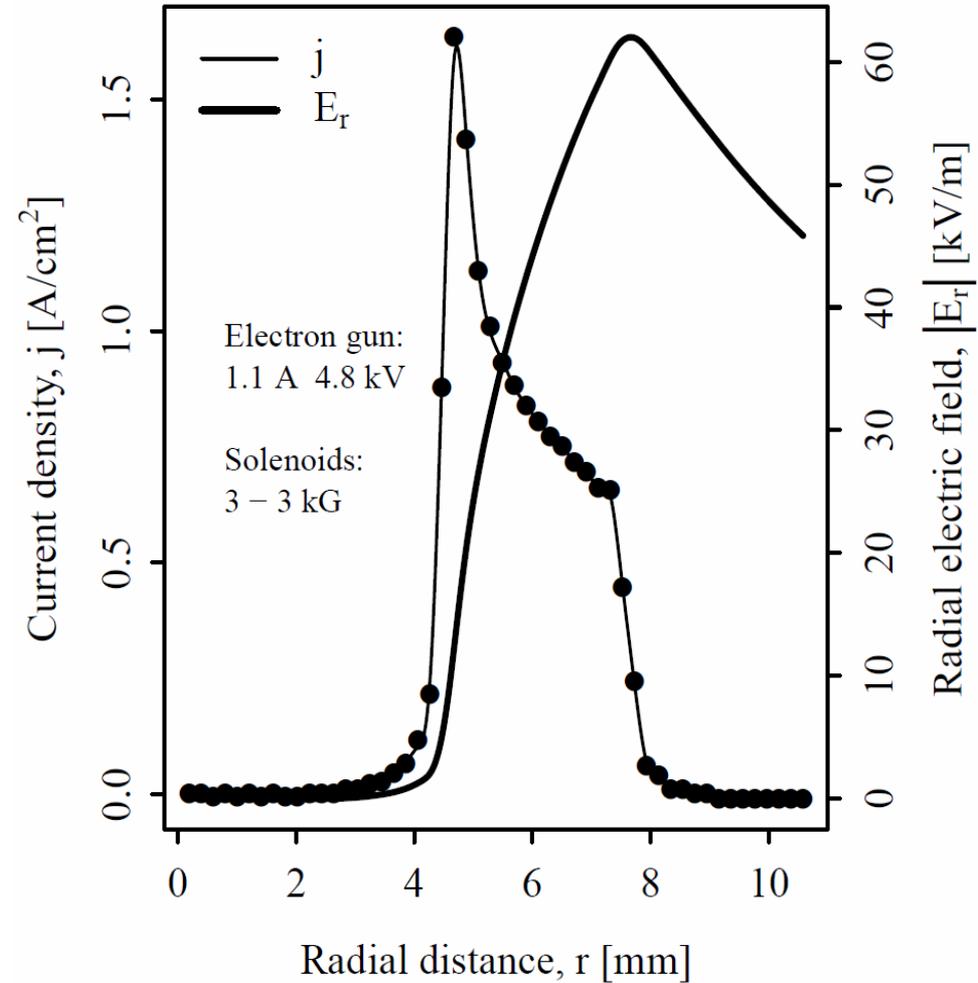
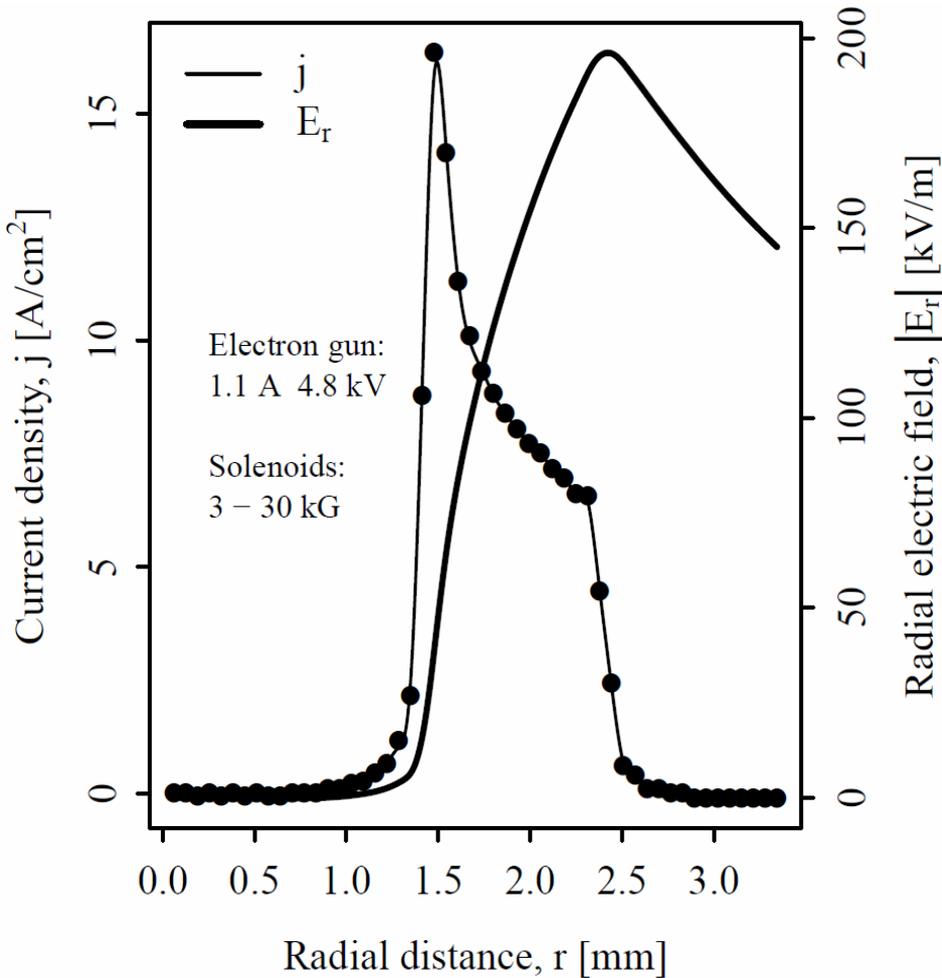
Yield: **1.1 A** at 4.8 kV
Profile measurements



Tungsten dispenser cathode with convex surface
15-mm diameter, 9-mm hole



Actual Current densities and Fields



The integral (2m per TEL) varies from 60 kV/m x m to 300 kV/m x m
Add magnetic force (20% and 2 lenses \rightarrow 150 kV/m x m to 700 kV/m x m

Discussion:

1. the scheme does not require sextupoles or other nonlinear elements – it's single (or few) turn extraction not multiturn
2. Seemingly needs much less aperture
3. what is the HEBC kick required? Min 0.1 mm (septum width). Max HEBC edge width - ?
4. Requires TWO new elements: DC hollow electron beam and pulsed (strip-line?) dipole corrector that provides slowly varying orbit correction but only for the bunch or bunches of interest
5. Can RR e-cooler beam be modified to hollow and used in that scheme - ?

To consider:

- A) strength of the pulsed corrector – ideally to be 1-3 mm – does that leave enough wiggle room?
- B) thickness of the HEBC edge is 0.5-2 mm (variable) – what's needed?
- C) is the scheme tune sensitive? (in idealistic case of very thin edge – seemingly so, but in the case of extended edge - not?)
- D) optimal size of HEBC (radius and thickness), optimal beam to electron edge distance, optimal microstep size and function
- E) optimal placement of the septum – right before? Right after the electron edge?