LSP beam-target interaction simulations in WDM regime

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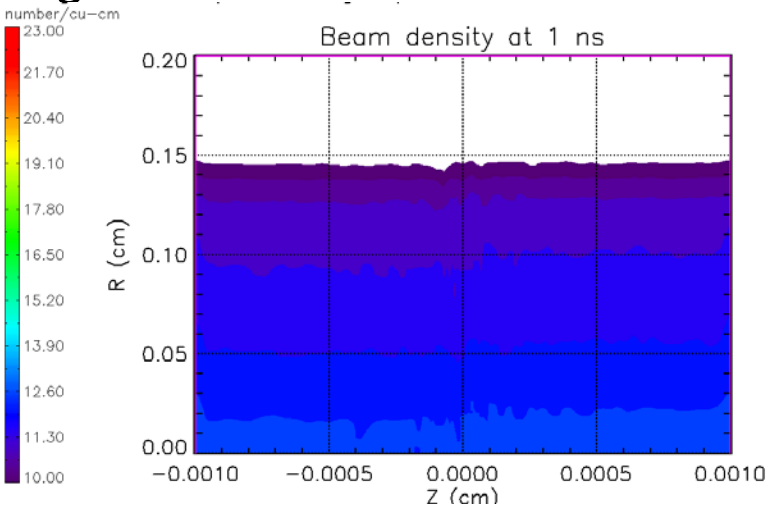
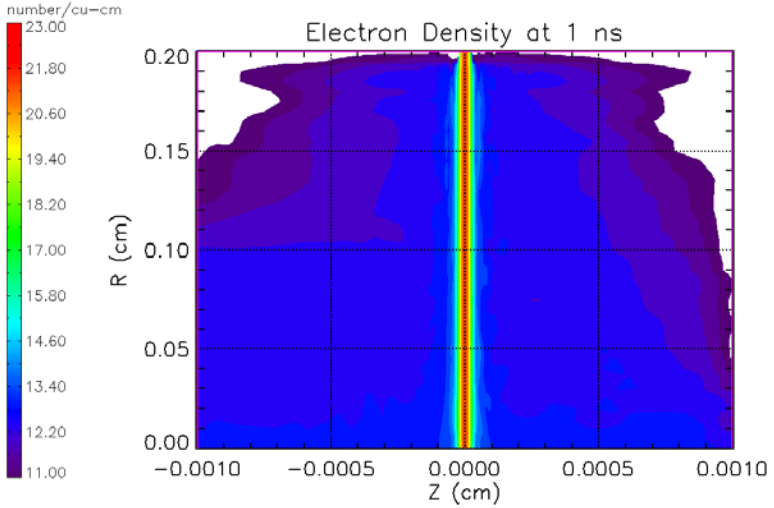
Implicit, hybrid simulation of ion beam-target interaction

- Electromagnetic LSP simulations includes inertial two fluid model for Al initialized at solid density, room temperature
  - Monte Carlo interactions with LMD resistivity
  - Kinetic beam description with specified dE/dx (ρ)
  - Plasma can also be described as kinetic particles
- EOS is only approximately implemented
  - Bill Sharp is working on more complete implementation
  - Z is specified, plasma collisionality is adjusted to correct momentum and energy equations
  - Ion Lorentz force is wrong
  - No strength of material, surface tension (Al rigid until melting at 0.08 eV)
- Why?
  - Grant asked about beam neutralization…
  - Look at collective interactions, neutralization. Model beam diagnostics beyond foil. Might consider exotic EOS descriptions.

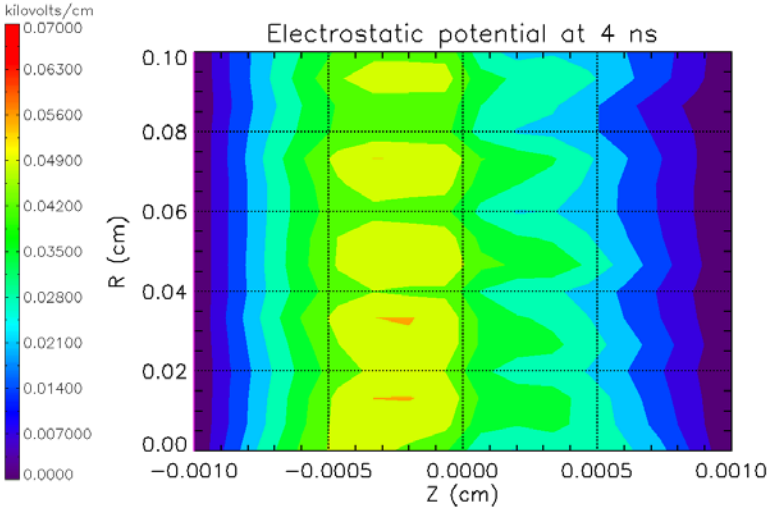
Beam neutralization in plasma and foil

- Electron density required for neutralization is down 10 orders-of-magnitude from solid – 10 A 3-ns compressed K^+ beam

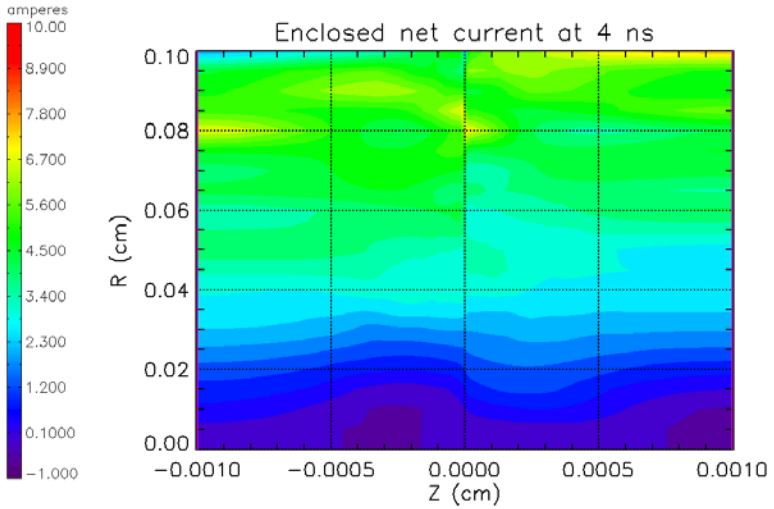




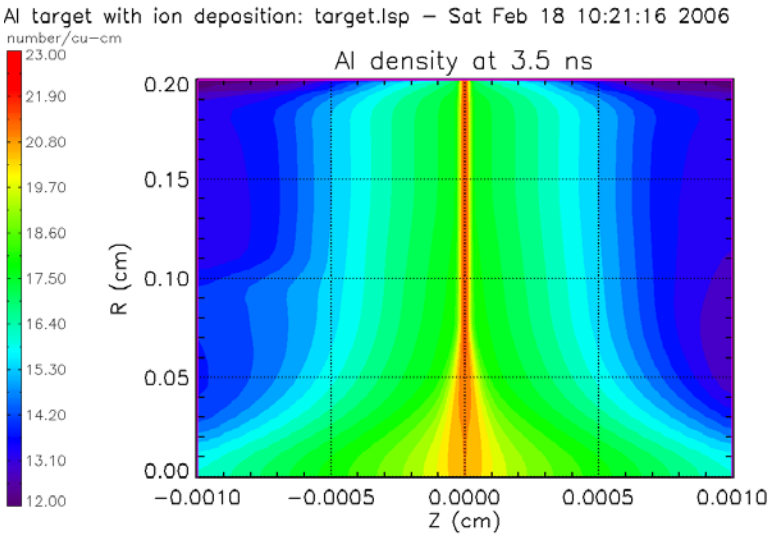
Peak 60-eV potential at 4 ns

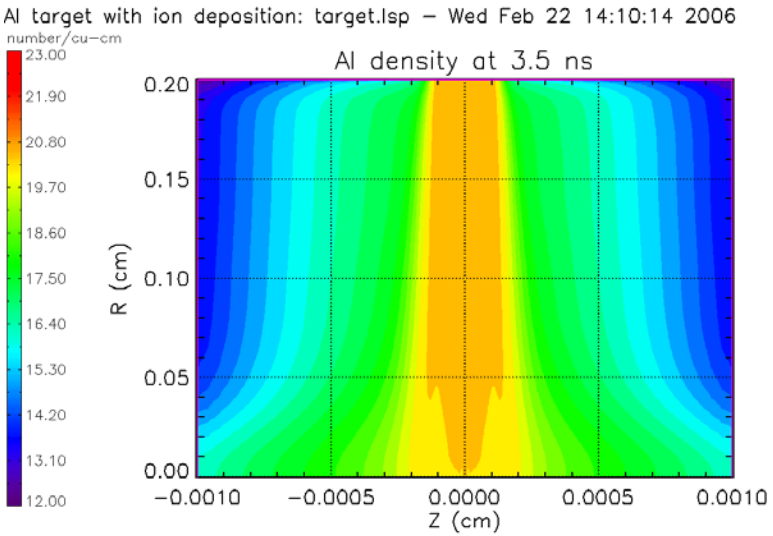


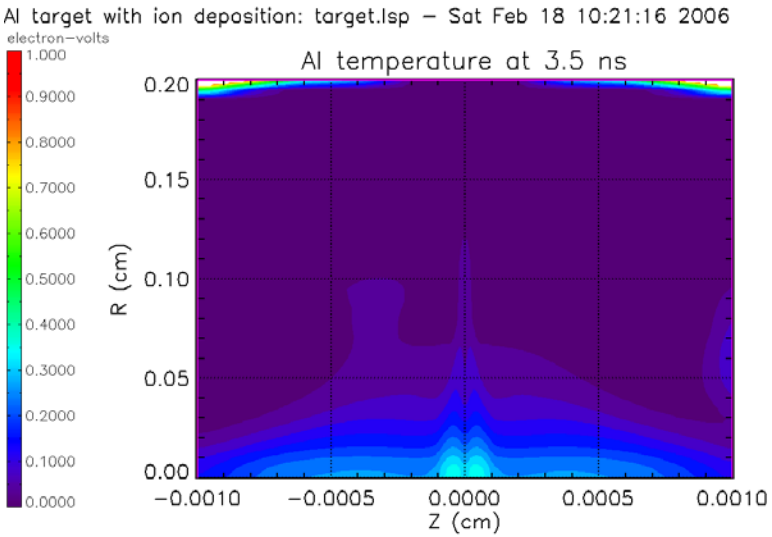
Peak 5-A net current at 4ns

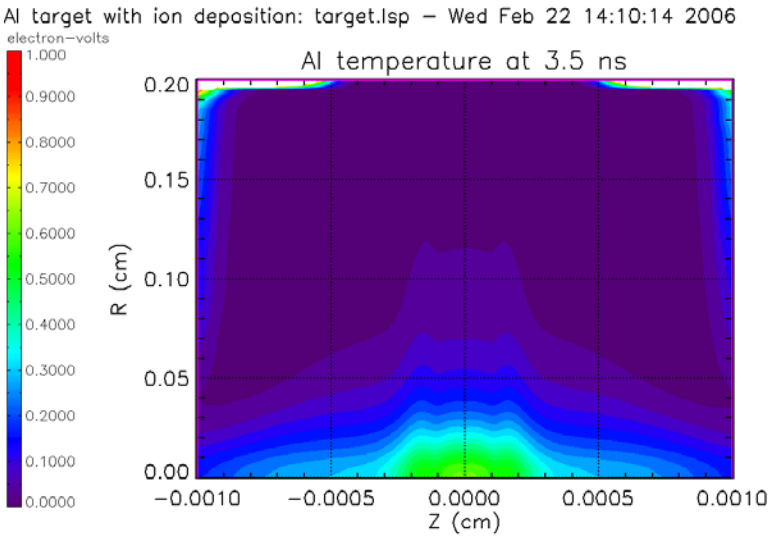


Solid vs. “foam” Al target









T = 0.4 eV

T = 0.7 eV