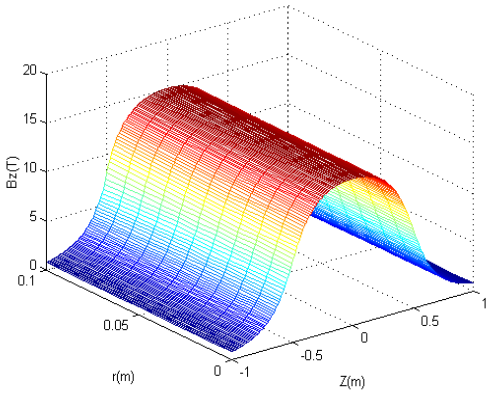
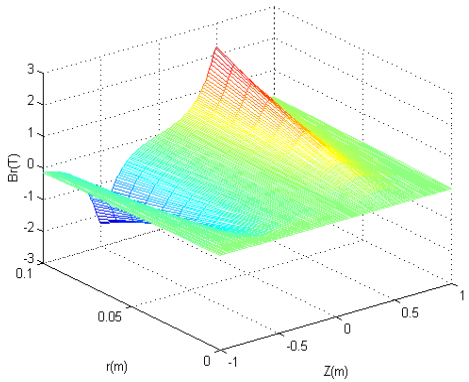
Simulation Status of Mercury Jet Target

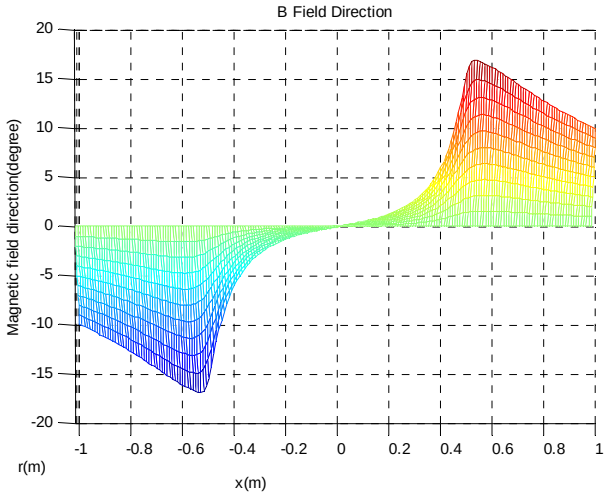
HeeJin Park

B Field Map and Jet Distortion (1)

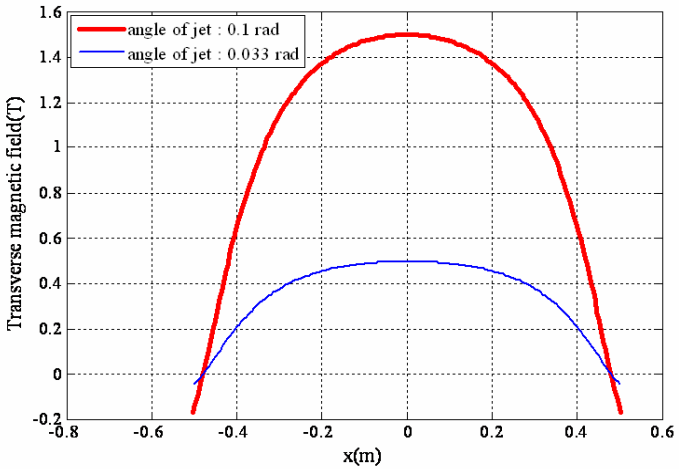
Pulsed Solenoid Magnetic Field (15T)

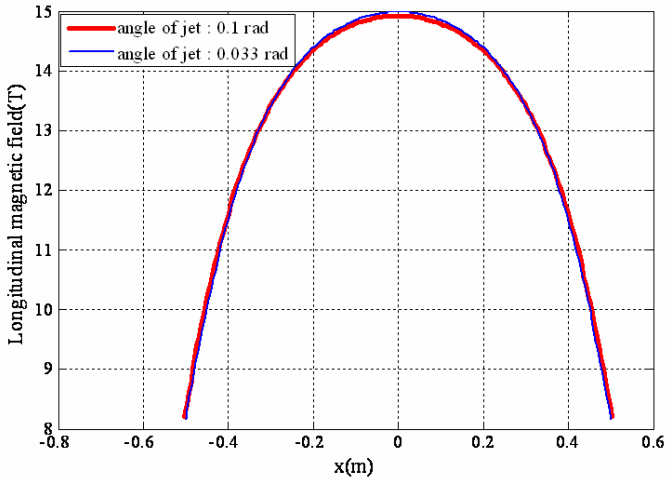






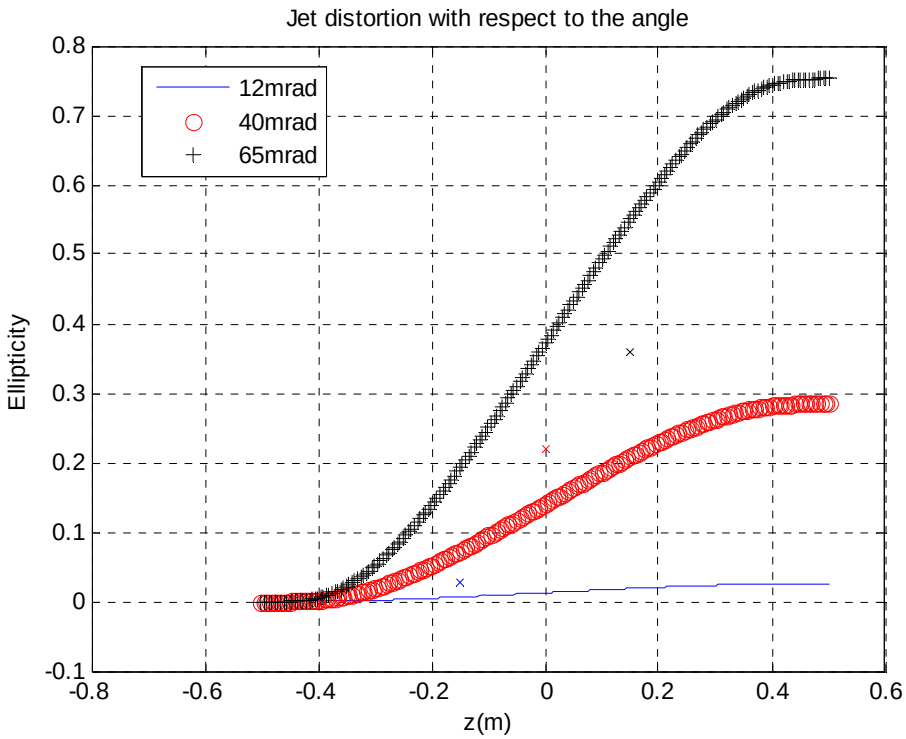
Magnetic Field Along Hg Jet Axis





B Field Map and Jet Distortion (2)

Distortion Ratio along Hg Jet Axis



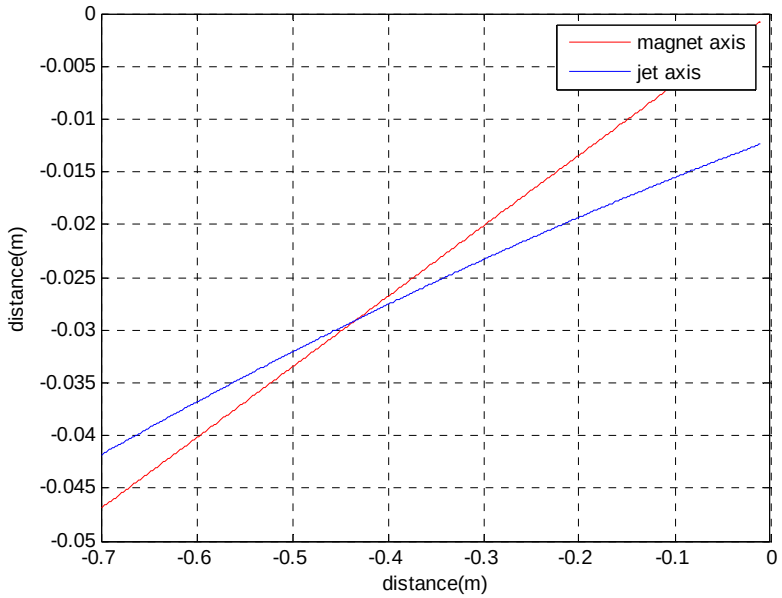
Distortion ratio

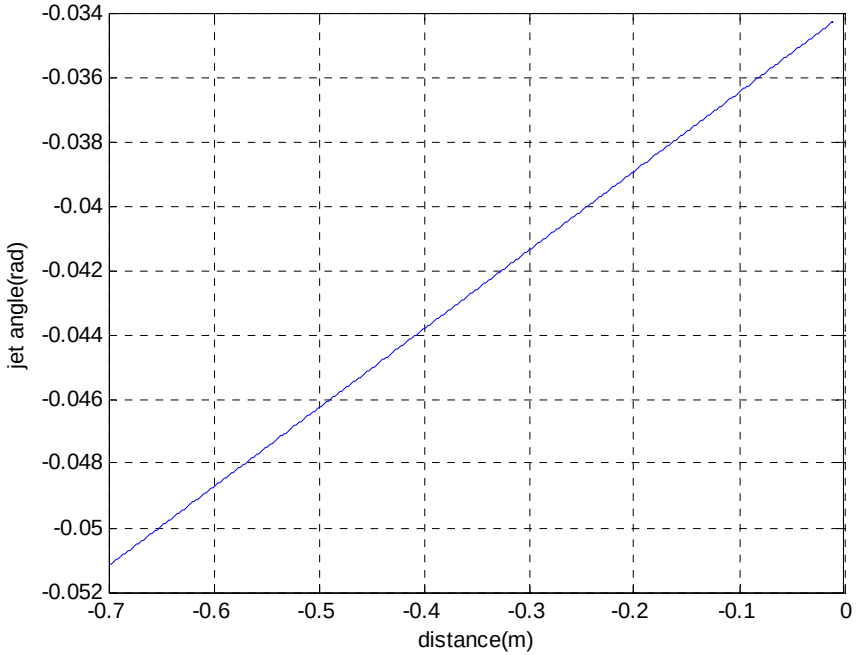
$$\varepsilon(z) = \frac{\kappa}{2\upsilon\rho}\iint B_y \frac{\partial B_y}{\partial z} dzdz$$

J. Gallardo et al., BNL, 2002

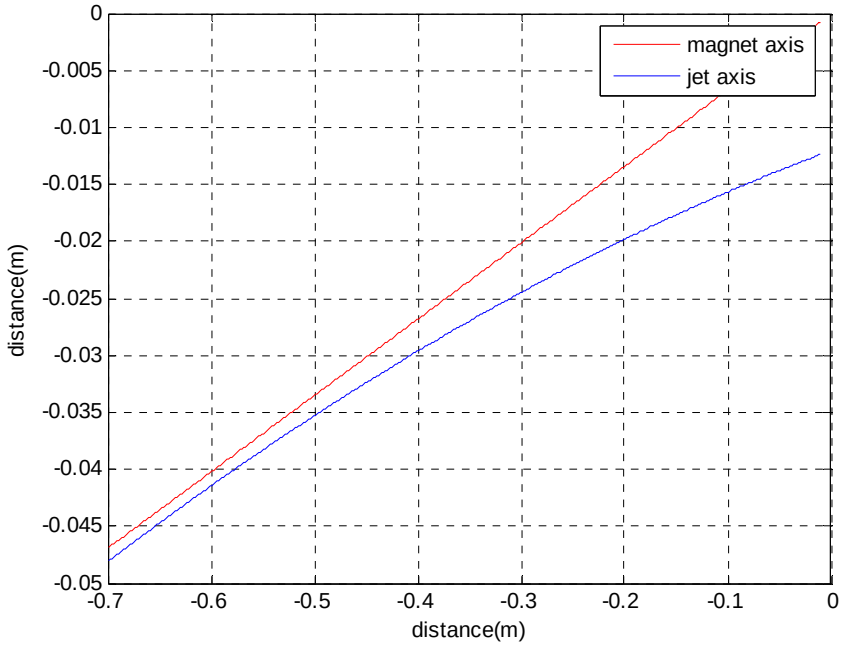
Propose to simulate 15m/s jet velocity with surface tension

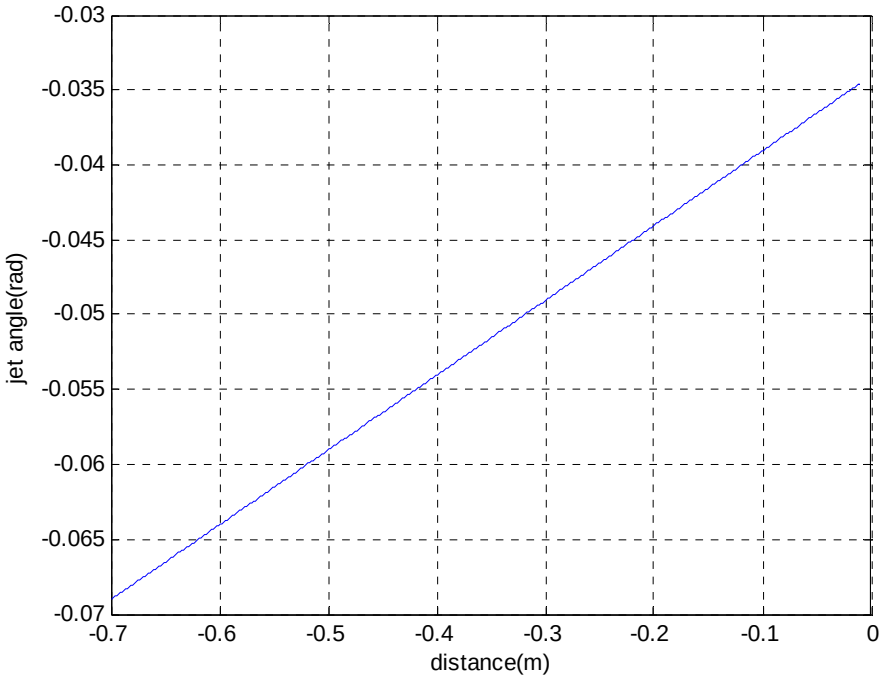
Hg Jet Projectile, 20m/s, 67mrad, 1.2cm offset





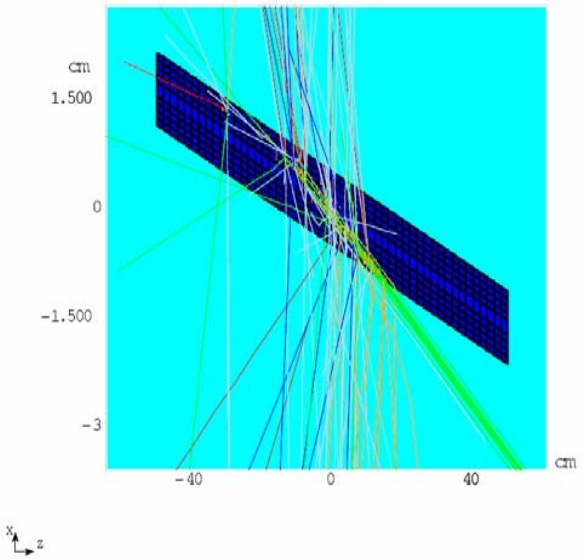
Hg Jet Projectile, 15m/s, 67mrad, 1.2cm offset

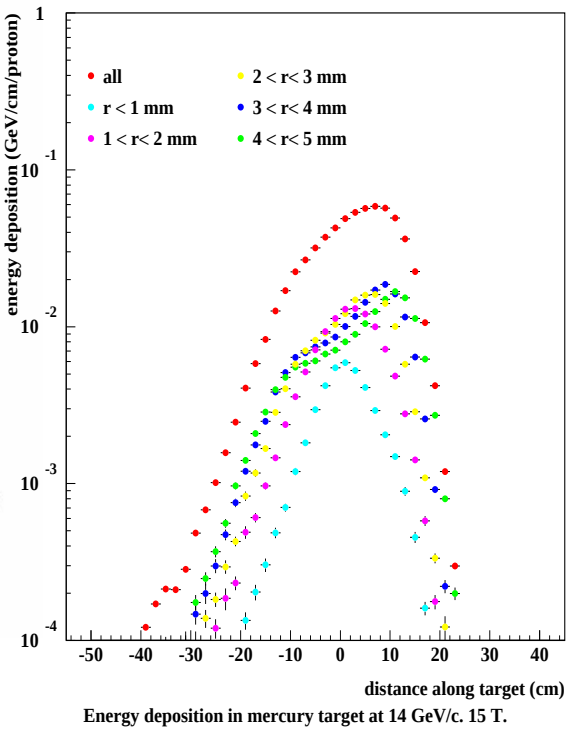




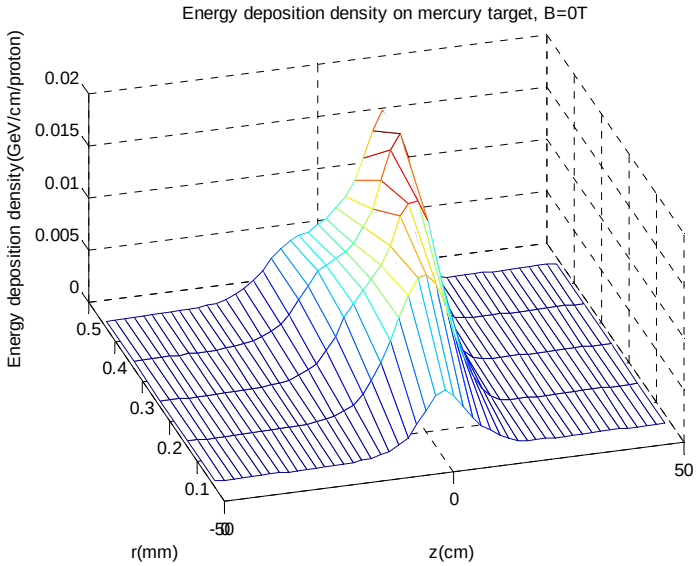
Energy Deposition By Beam On Hg Target

E = 14 GeV/c, B = 0 T, Target angle 33 mrad, Beam angle 67 mrad





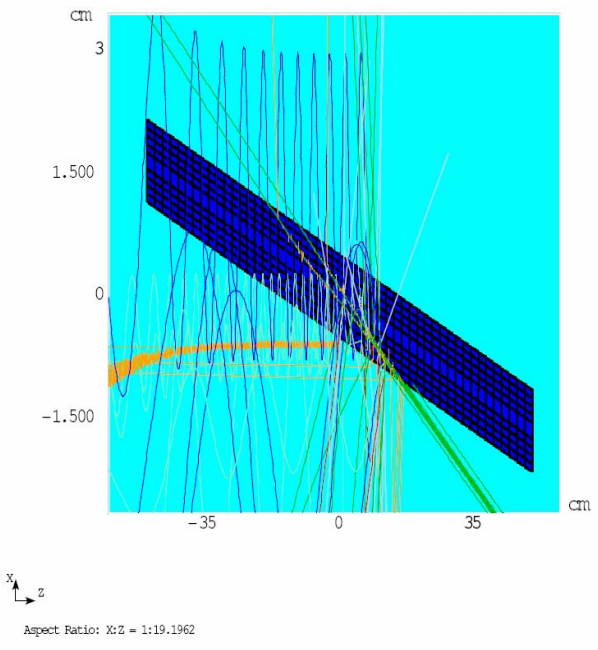
Energy deposition in mercury target at 14 GeV/c. 15 T.

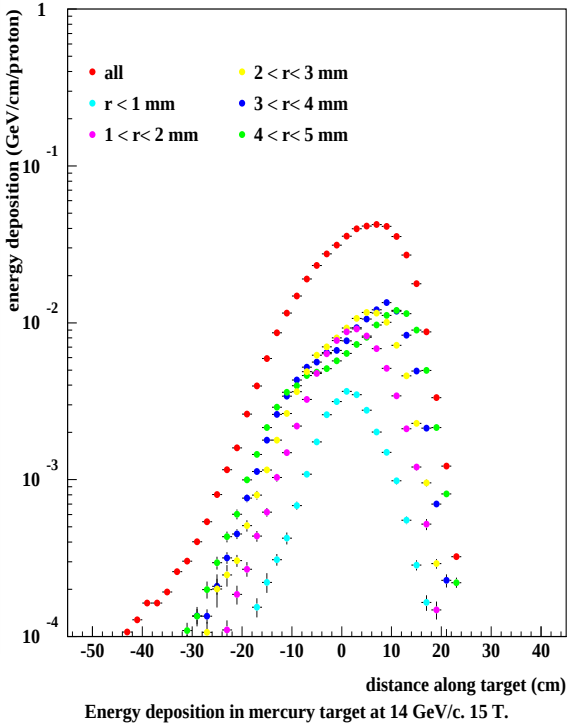


Sergei Striganov, Fermilab, Jan. 2008

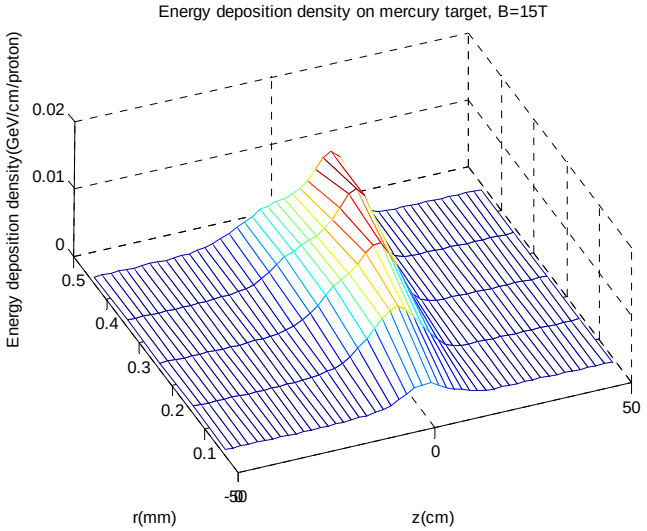
Energy Deposition By Beam On Hg Target

E = 14 GeV/c, B = 15 T, Target angle 33 mrad, Beam angle 67 mrad





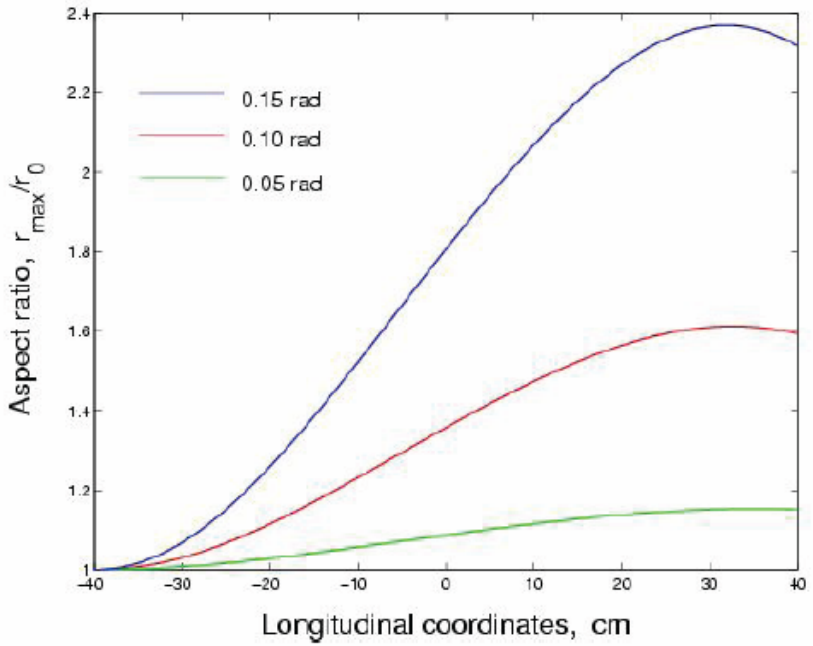
Energy deposition in mercury target at 14 GeV/c. 15 T.

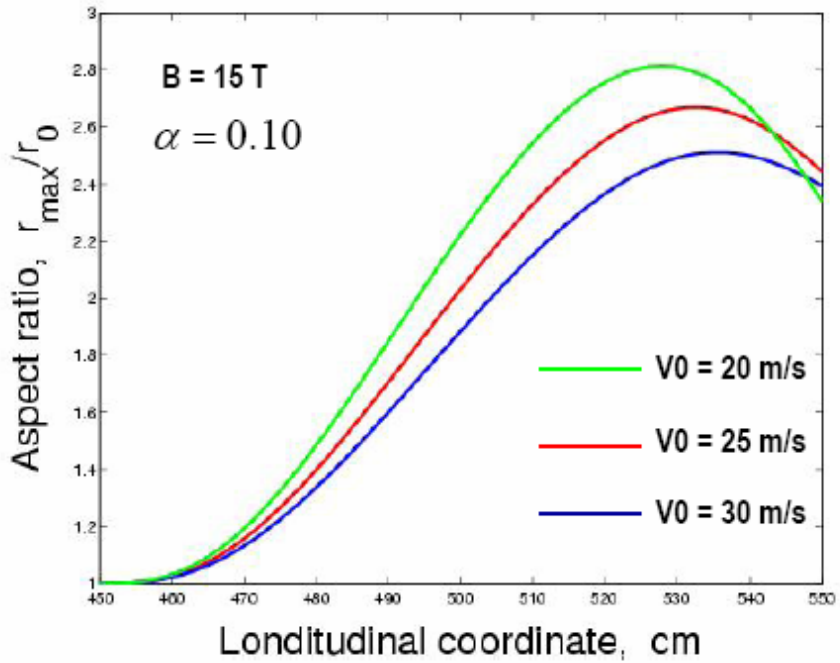


Propose to simulate 3D model for the case of 14GeV/c, 24GeV/c with 0T~15T field.

Sergei Striganov, Fermilab, Jan. 2008

Aspect Ratio of Jet





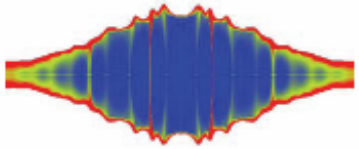
- Jet distortion (aspect ratio) strongly depends on the angle with the solenoid axes (it increases at larger angles)
- Jet aspect ratio increases at smaller jet velocities (at least if the change of velocity is small compared to the reference velocity of 25 m/s)

Rmax/R0 = 1.35 at V = 25 m/s, alpha = 100 mrad, B = 15 T
Rmax/R0 = 1.09 at V = 25 m/s, alpha = 50 mrad, B = 15 T

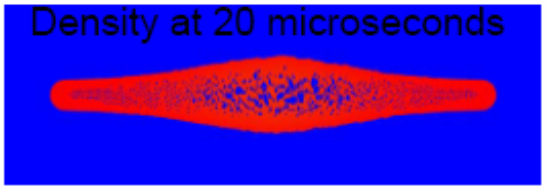
Propose to simulate 15m/s jet velocity for the case of 0T~15T field.

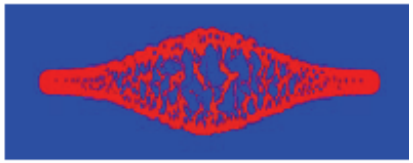
Roman Samulyak, BNL, 2005-2007

Evaluation of Cavitation Model

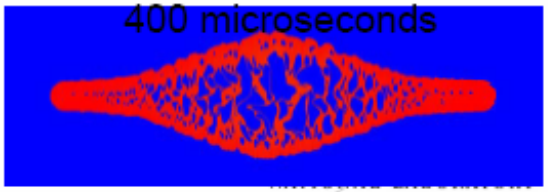


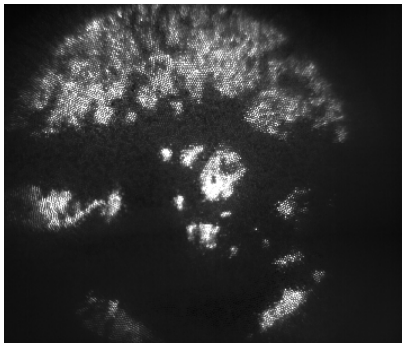
Homogeneous model

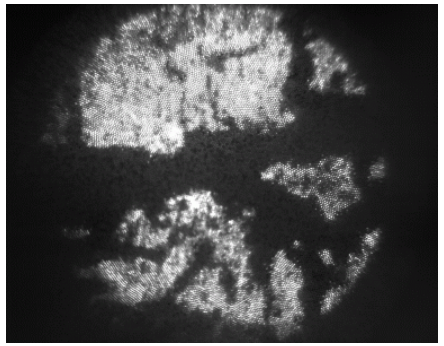


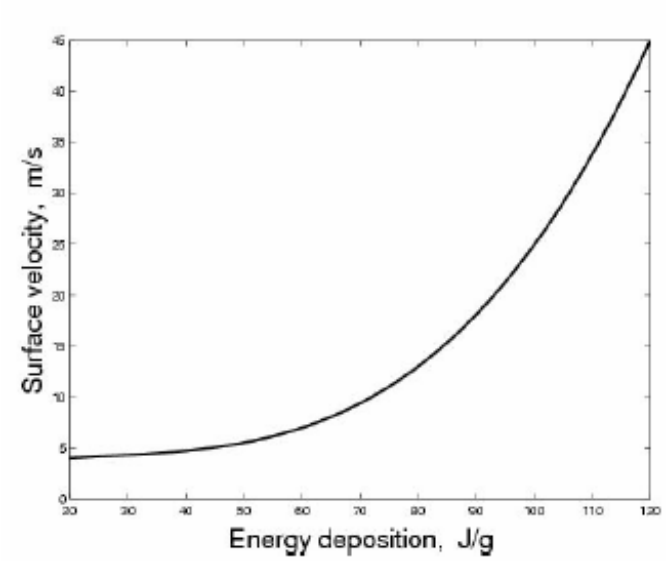


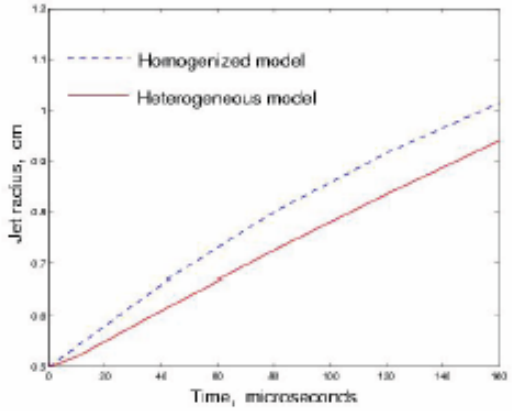
Heterogeneous model

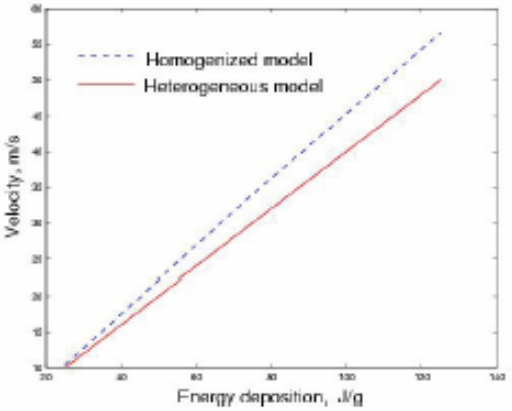












Propose to simulate cavitation model for the case of beam energy 14GeV/c, 24GeV/c with 0T~15T field.

Roman Samulyak, BNL, 2005-2007