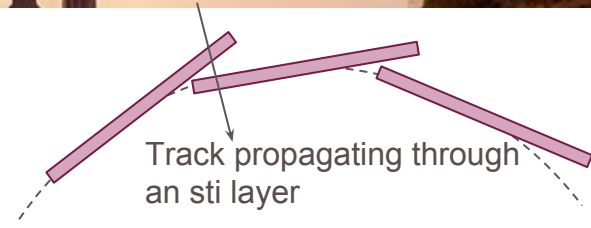
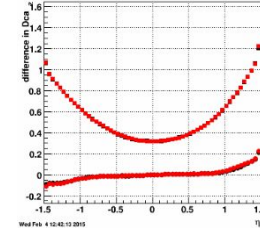
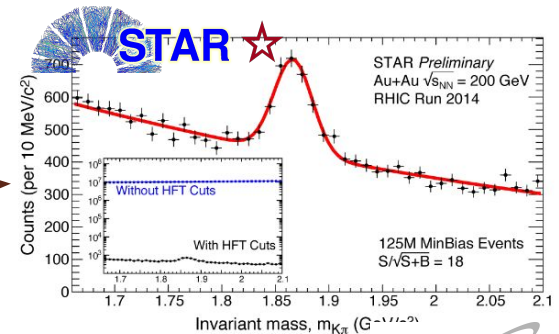
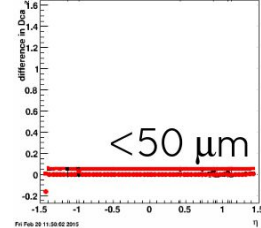


# STAR Reconstruction Improvements for Tracking with the Heavy Flavor Tracker

- ★ The Heavy Flavor Tracker (HFT) program extends STAR's physics reach into the heavy flavor sector via topological identification of charmed hadrons.
  - Requirement: DCA pointing resolution of  $50\ \mu\text{m}$  or better
- ★ The STAR Sti tracker was designed to leverage the high degree of azimuthal symmetry in the STAR detector -- radially-sorted geometry representation and simplified track propagator, balancing speed and accuracy
  - Sti geometry created by averaging user-defined list of AgML/ROOT volumes
  - Tracks assumed to intercept single volume in a layer, and cross full thickness
- ★ Complexity of HFT geometry presented new challenges to the Sti model
  - Multiple solutions in a single layer lead to missing material and/or hits
  - Excessive number of layers created by AgML conversion compromised speed -- exacerbated by physics program event yield requirements
  - Volume averaging procedure too simplistic, misestimating material effects
- ★ Solutions
  - Implement native Sti geometry model for HFT: 100-fold reduction of complexity
  - Split radial structures to properly account for material budget
  - Split sensitive volumes and ensure unique assignment to Sti layers
- ★ Tracker changes: enabled tree search requiring three HFT hits minimum on the track, reuse of HFT hits on multiple track candidates

 $\Delta\text{DCA}_z$  TPC Only $\Delta\text{DCA}_z$  TPC+3HFT

## RESULT