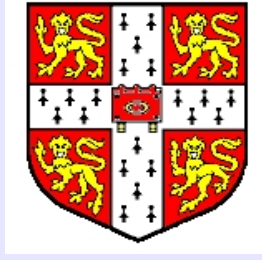


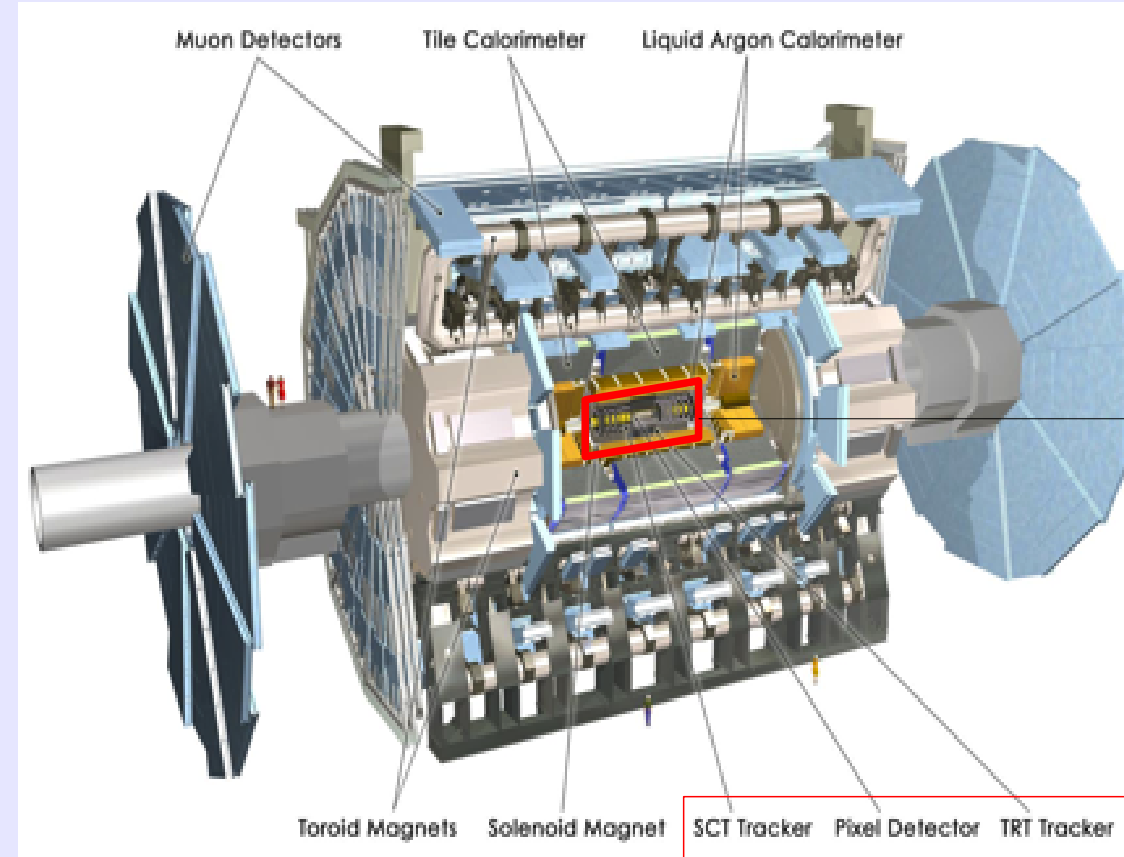
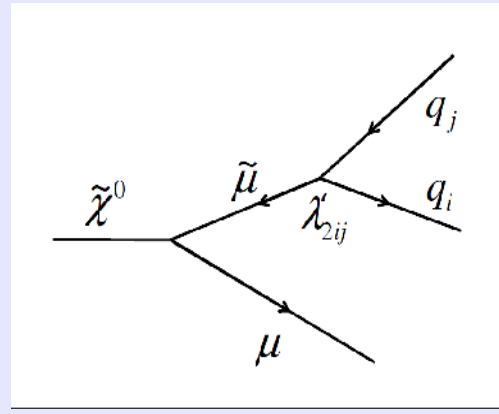
Search for displaced vertices arising from decays of new, heavy particles in 7 TeV pp collisions in ATLAS



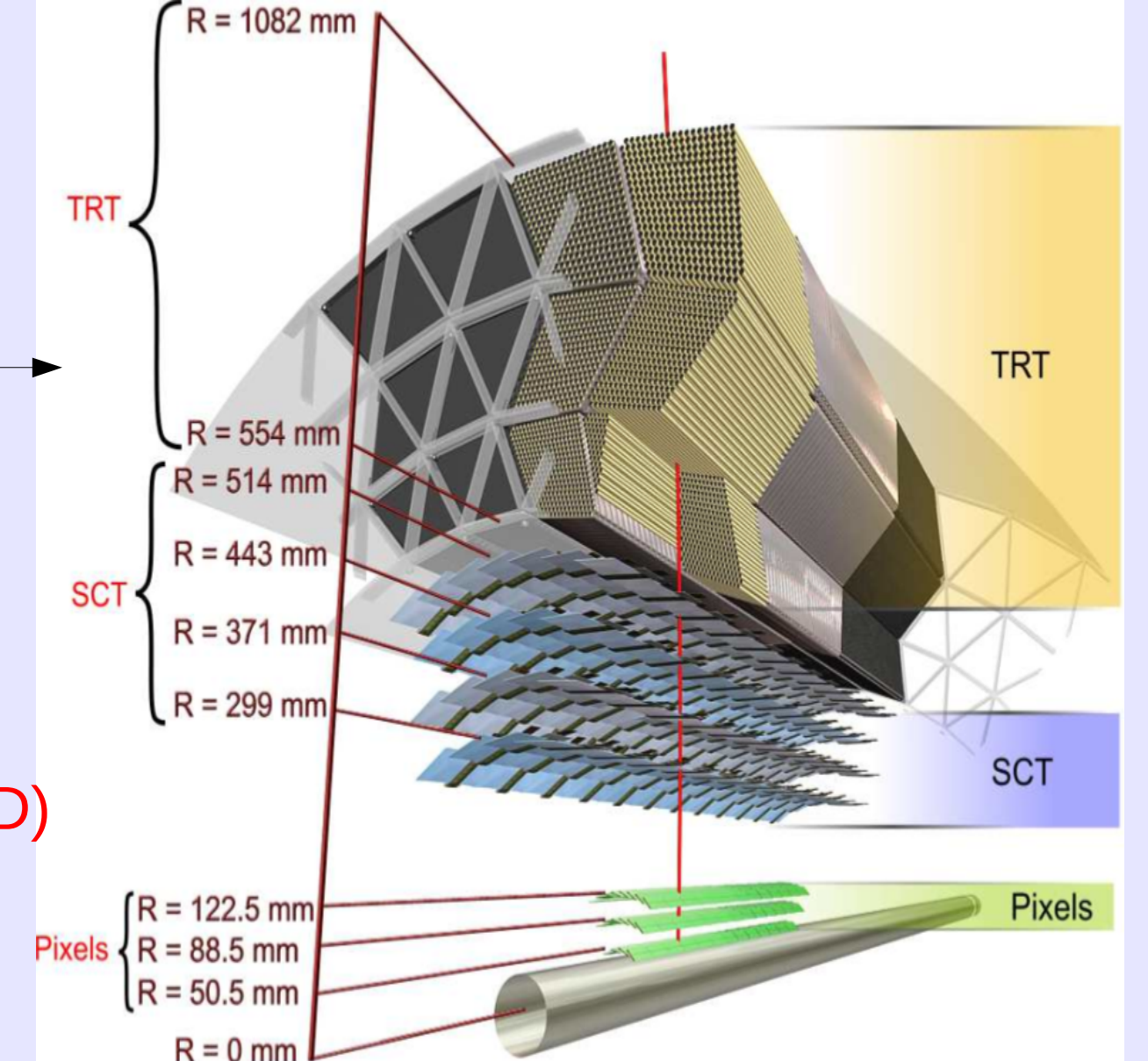
F. M. Brochu, University of Cambridge,
on behalf of the ATLAS Collaboration



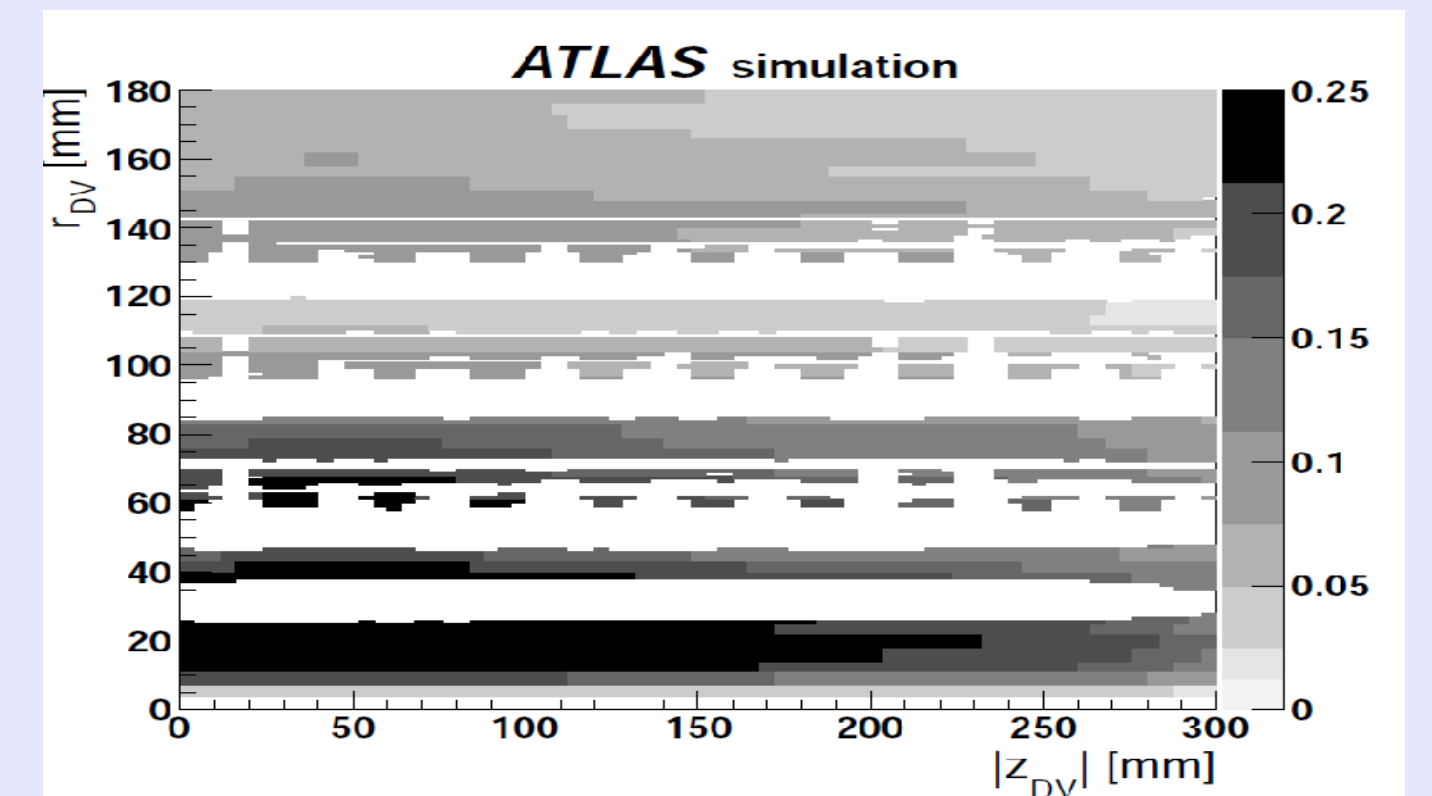
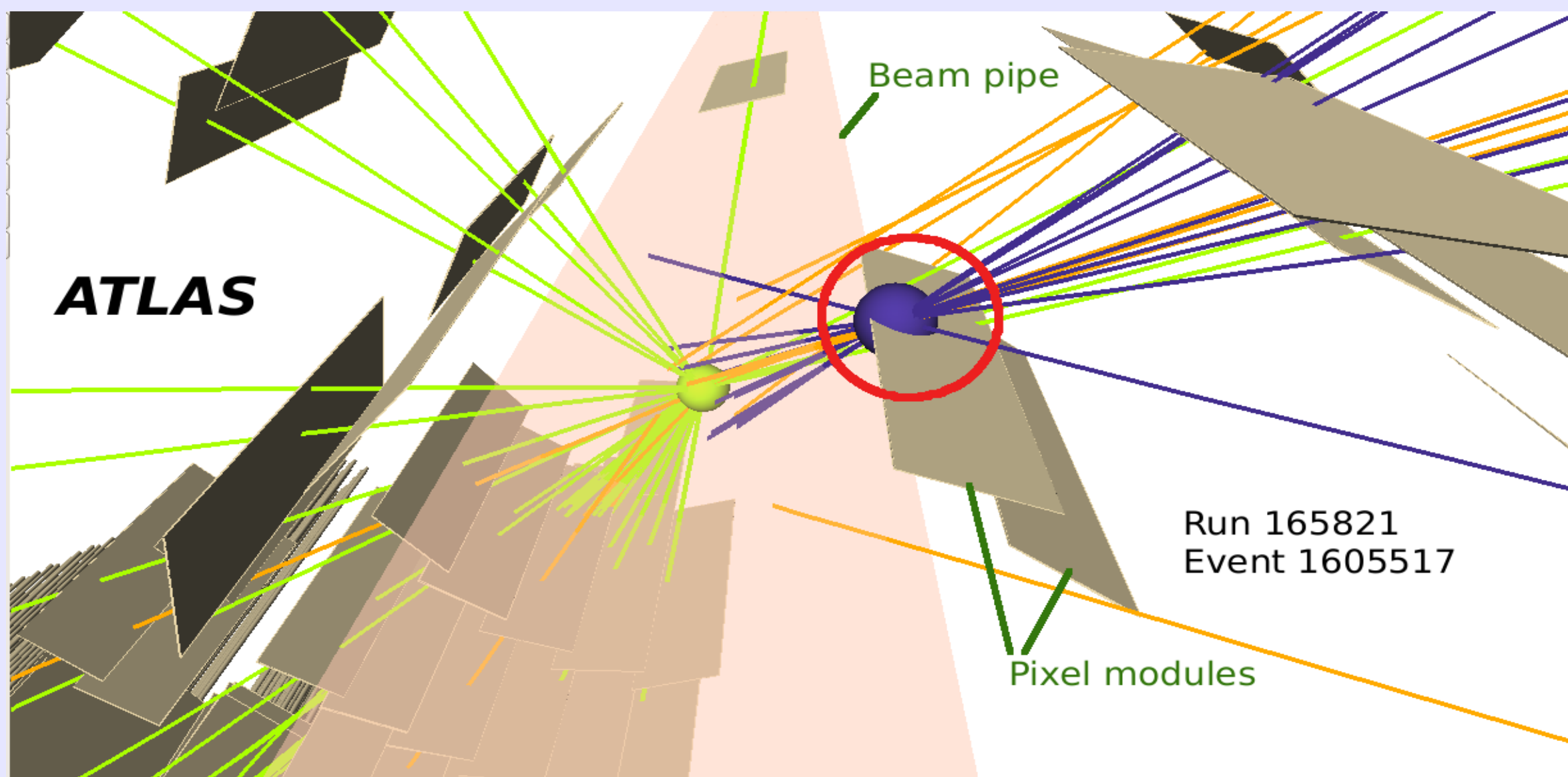
- SUSY with R-Parity Violation[1]: **Lightest SUSY particle (LSP) decays**, lifetime inversely proportional to RPV coupling squared.
- Small couplings \rightarrow long lifetimes \rightarrow **displaced vertices**
- **Only LSP will fly**. Other SUSY particles decay at IP.
- RPV coupling $\lambda'_{2ij} \rightarrow$
- LSP decays into 1 muon, 2 jets coming from a displaced vertex.



Inner Detector (ID)

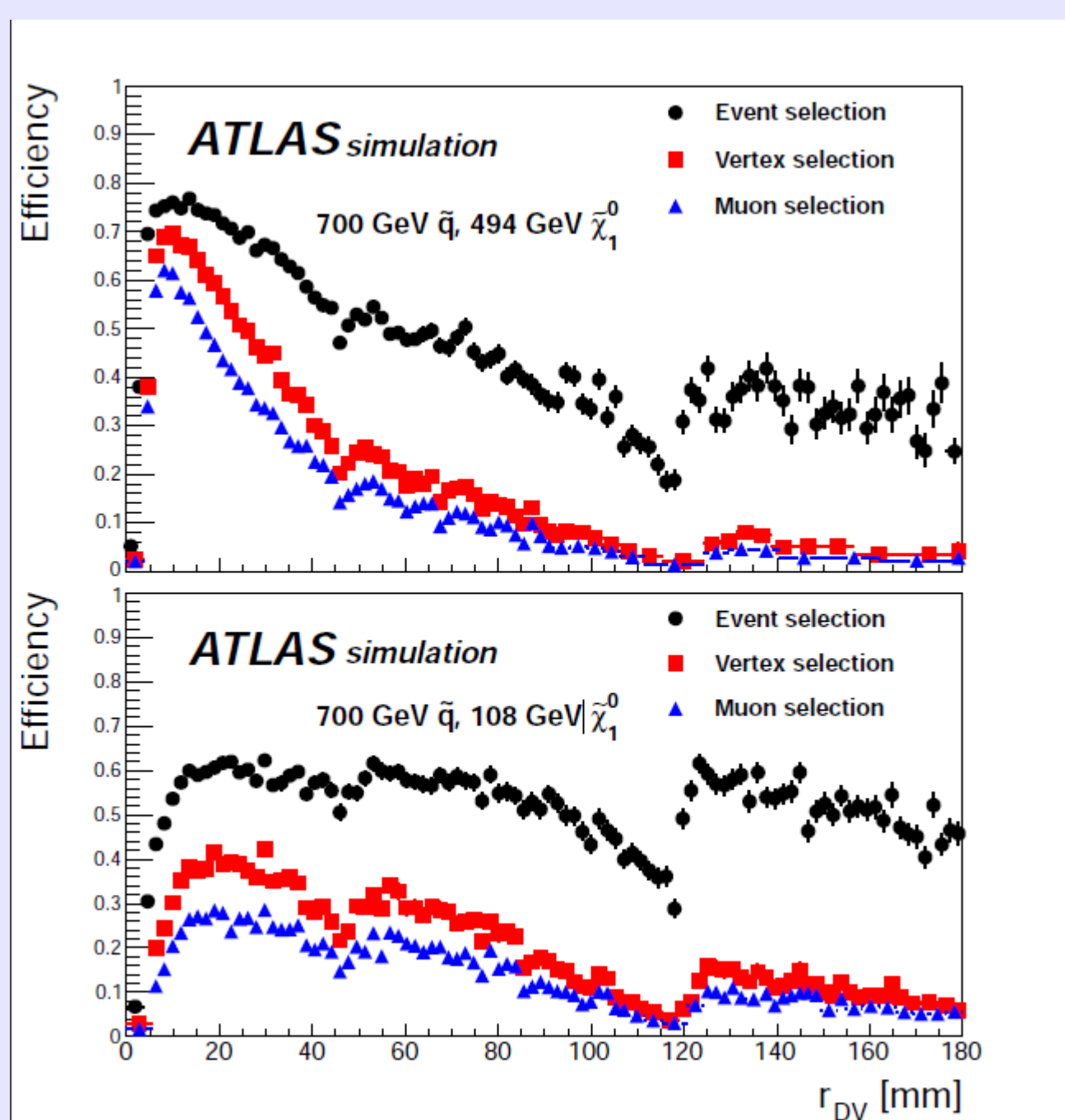


Looking for LSP decays inside Pixel detector \rightarrow Search based on ID data mostly.

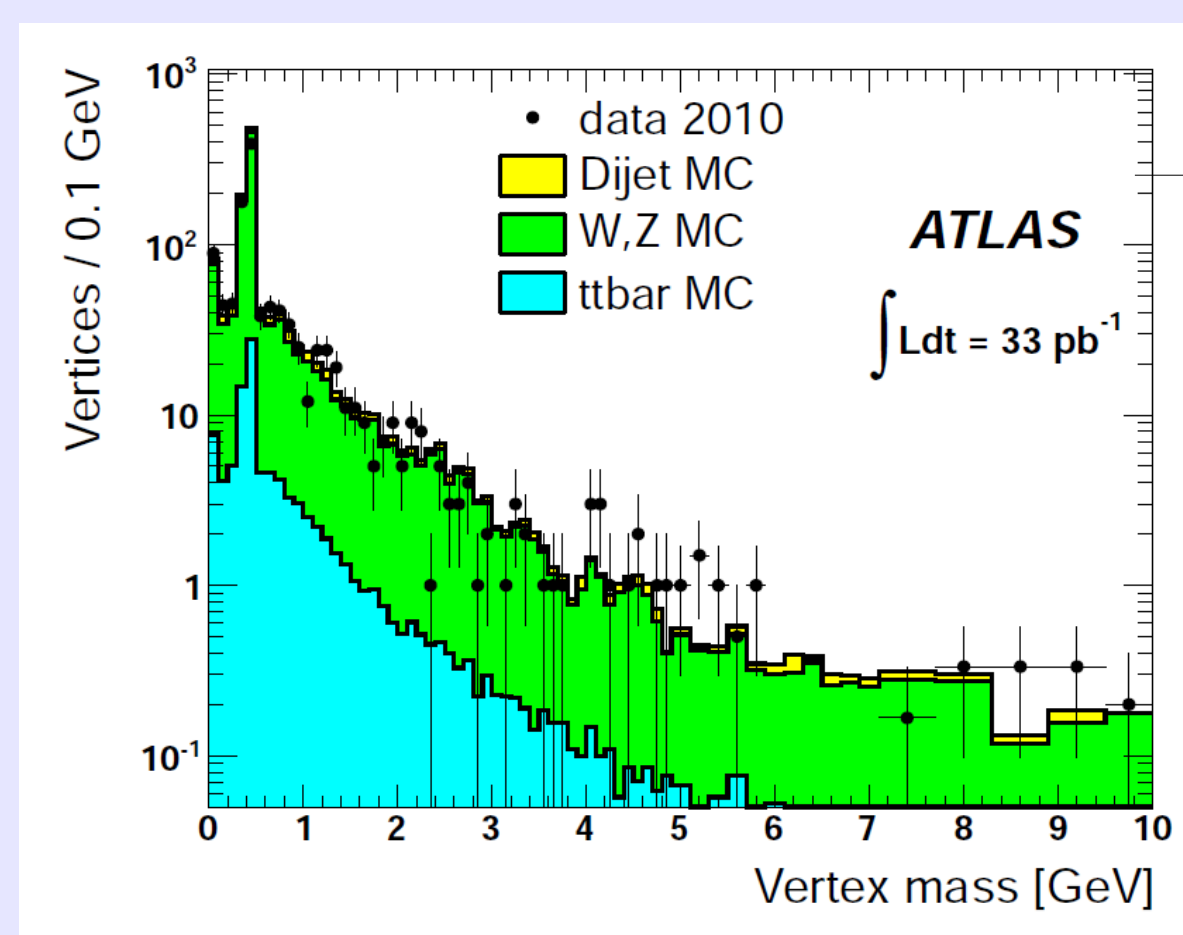


Removal of detector material interactions: Using low mass DV in data or MC truth to build material maps. Effect of removal in Reco efficiency map above (white strips \rightarrow beam pipe and pixel layers).

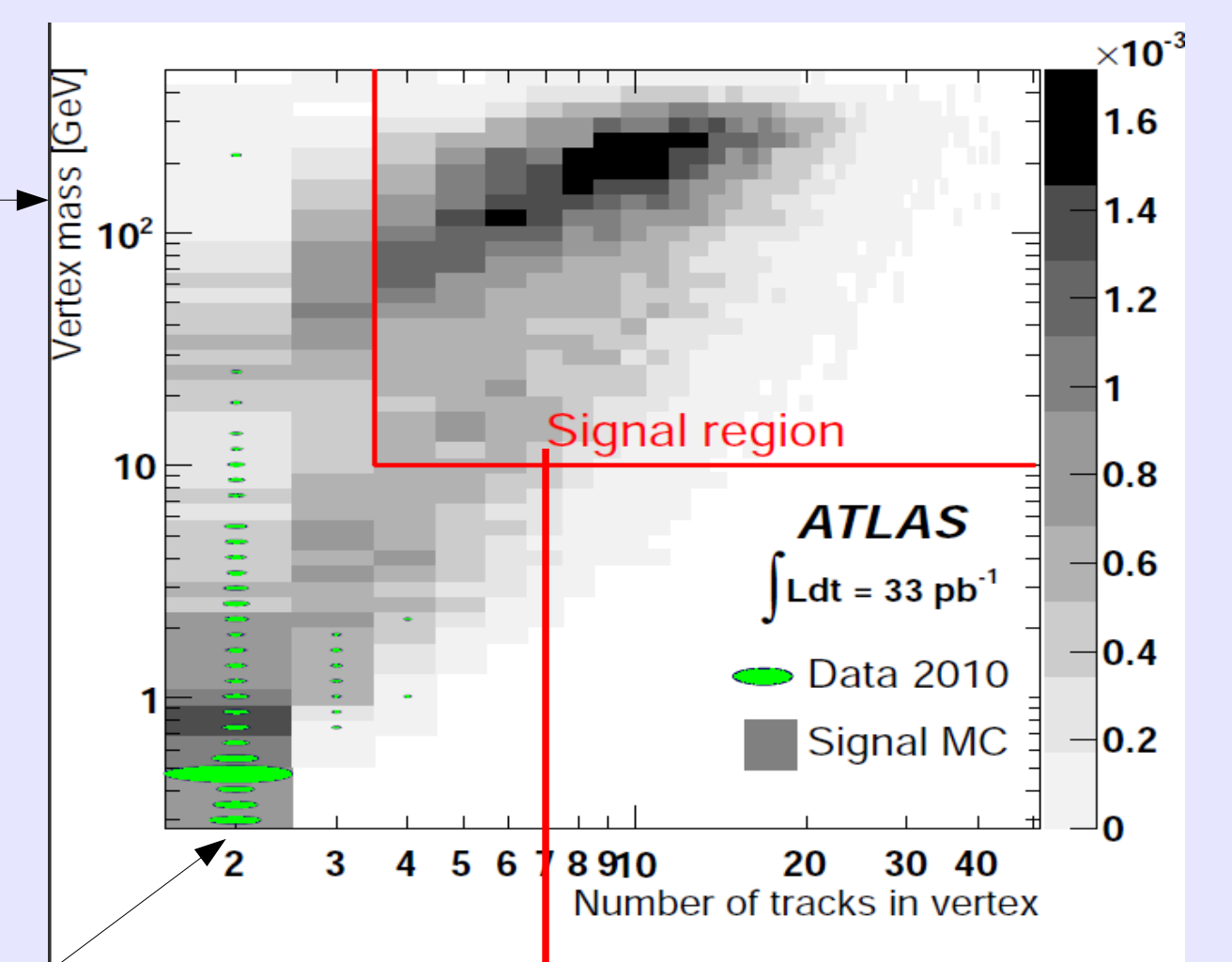
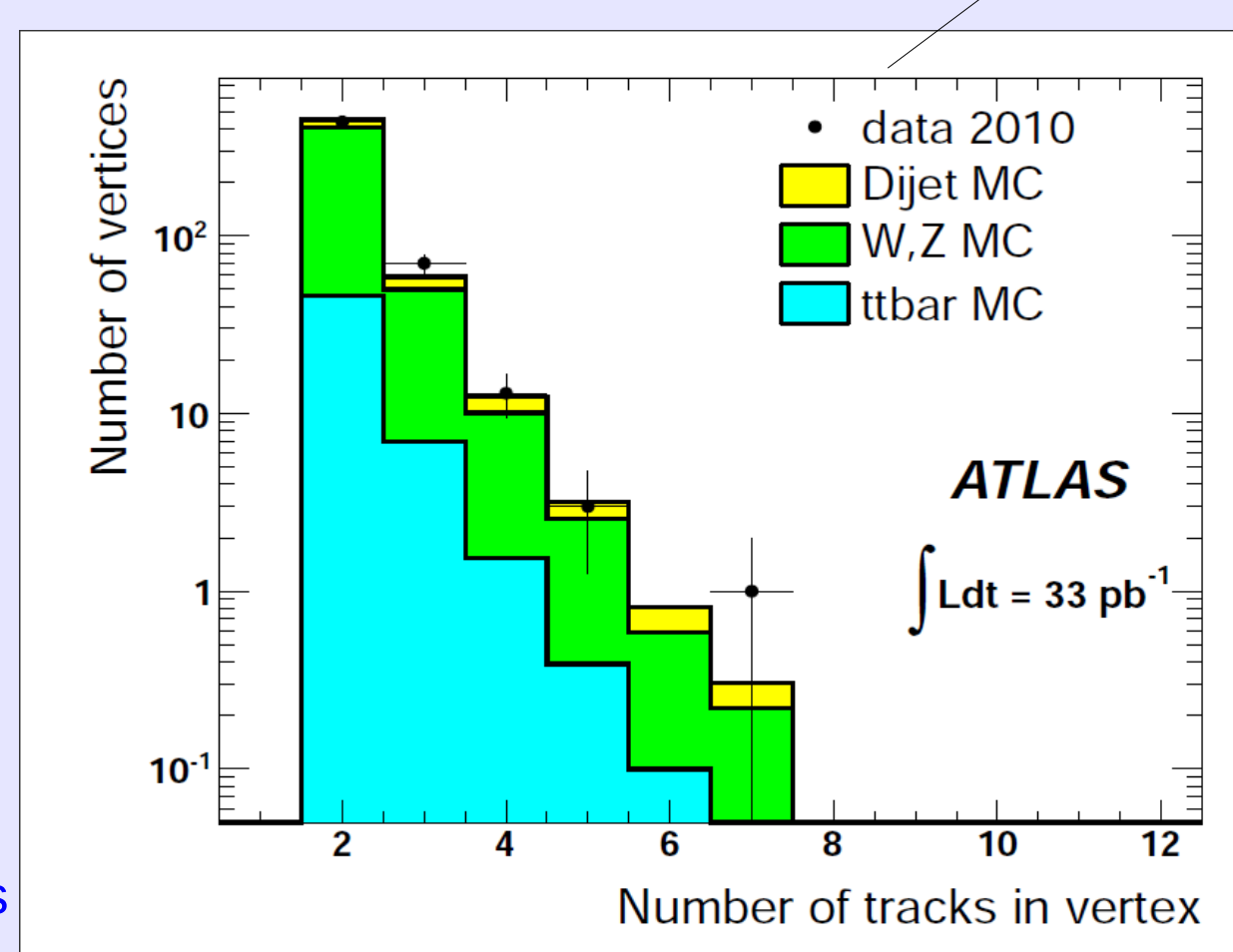
Displaced vertices (DV) in data: interactions with detector material



- Event selection: non-pointing tracks ($|d_0| > 2$ mm), $p_T > 1$ GeV \rightarrow vertex reco. Normal ATLAS tracking used (not optimized for large d_0 track reconstruction).
- Vertex selection: $\chi^2/d.o.f < 5$, not in material Map, **vertex mass > 10 GeV**, at least 4 tracks.
- Muon selection: at least one muon (ID + MD), $p_T > 45$ GeV (based on level 1 muon trigger $p_T > 40$ GeV).
- Dominant systematic errors: trigger efficiency, 4.3% (Z \rightarrow mumu sample), muon reco eff vs d_0 , 3.5-8% (cosmics muons), vertex reco eff: 3-4.3 % (K0s samples).



After Event and Muon selection cuts: data/MC distributions of displaced vertex quantities



No signal found \rightarrow Limits on prod. x-section

