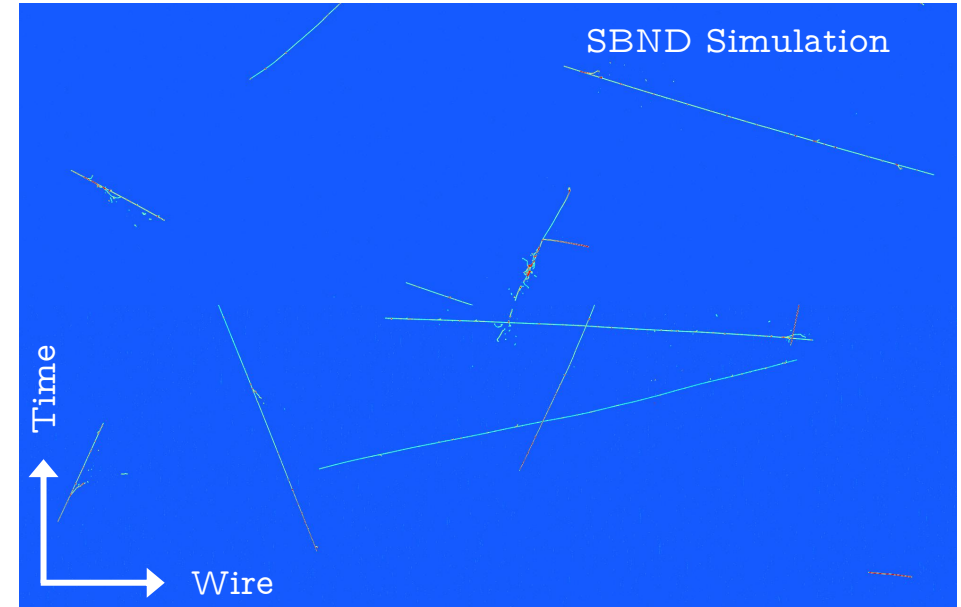


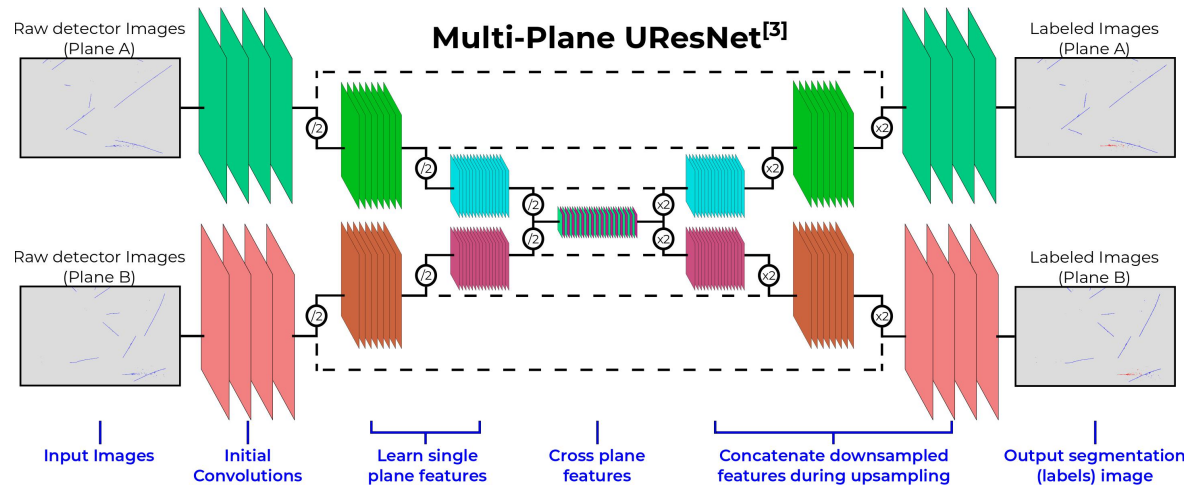
# Deep Learning in SBND

SBND, a surface-running liquid argon time projection chamber, is a critical detector for the SBN Program to probe oscillation anomalies and measure neutrino cross sections for DUNE

Because of the slow drift velocity in liquid argon, SBND is swamped with cosmic rays. **Greater than 60% of all SBND events will be purely cosmic interactions in the TPC.**



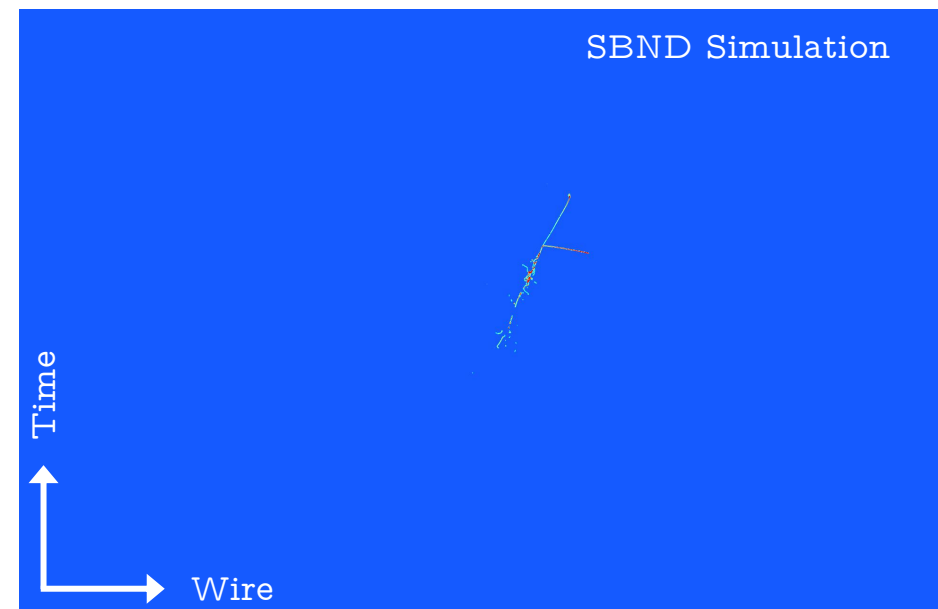
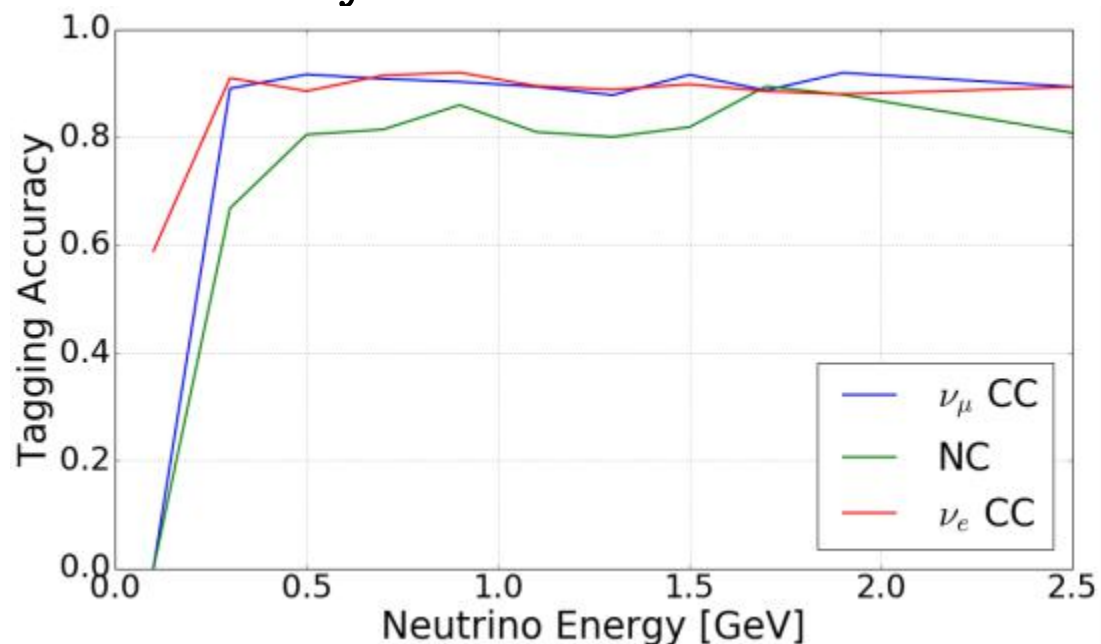
We have developed a novel deep learning technique to **reject cosmic only events, and remove cosmic pixels from neutrino interaction events.**



# Deep Learning in SBND

With basic cuts on number of neutrino pixels and cross-plane matching, SBND can achieve **89% neutrino purity** with **72% neutrino efficiency** (**89%  $\nu_e$  CC efficiency!**)

Additionally, passing events have **~90% neutrino pixel accuracy** above a few hundred meV.



Network output selects only the neutrino pixels.

**This poster demonstrates the successful use of deep learning to mitigate the cosmic backgrounds in surface LArTPCs to unprecedented levels.**