

Synergy between the tracker layer layout and track reconstruction in collider environment with high pileup

Tuesday, 10 July 2018 14:00 (15 minutes)

Majority of currently planned or considered hadron colliders are expected to deliver data in collisions with hundreds of simultaneous interactions per beam bunch crossing on average, including the high luminosity LHC upgrade currently in preparation and the possible high energy LHC upgrade or a future circular collider FCC-hh. Running of charged particle track reconstruction for the general purpose detectors at these colliders is expected to be at least comparable in cost to the construction and operation of the tracking detectors. We show that the sensitive layer arrangement in the design of a tracking detector can play a vital role to reduce complexity and cost of the charged particle track reconstruction. Our case study is based on realistic simulation of a tracking detector similar to that of CMS to be operated in HL-LHC. We show that a customary layout with equal layer separation is inferior to that with grouped/paired layers with a smaller distance within a group, which allows for more performant track segment reconstruction. This synergy between the hardware and software choice can allow for a reduction of the total cost of a future collider experiment.

Primary authors: KRUTELYOV, Slava (Univ. of California San Diego (US)); TADEL, Matevz (Univ. of California San Diego (US)); YAGIL, Avi (Univ. of California San Diego (US)); MASCIOVECCHIO, Mario (Univ. of California San Diego (US)); WUERTHWEIN, Frank (Univ. of California San Diego (US)); CERATI, Giuseppe (Fermi National Accelerator Lab. (US))

Presenter: KRUTELYOV, Slava (Univ. of California San Diego (US))

Session Classification: T2 - Offline computing

Track Classification: Track 2 –Offline computing