INTT-Calo Tracking

Yuko Sekiguchi

RIKEN

Motivation

- The TPC was not operational in the early period of pp collisions.
- Statistics is eight times larger than runs after TPC included.
  - Calorimeter+Silicon: 107 pb-1 (0mrad+1.5mrad)
  - All detector: 13 pb-1 (triggered, 1.5mrad)
  - Streaming: 3 pb-1
- Silicon tracks alone provide ~10% momentum resolution.
- By connecting the outer EMCAL with silicon tracks, a few percent momentum resolution can be achieved.
  - Invariant mass spectrum of J/ψ and Y
  - Direct photon
  - Asymmetry in particle production
  - pT differential flow

Takuya's study

- Takuya made a framework and estimated that pt resolution can be a few percent using Monte Carlo simulations as expected.

- https://wiki.sphenix.bnl.gov/index.php?title=INTT_AnalysisWorkshop2024_TakuyaKumaoka

~4 % pT by Calo+Silicon in pp

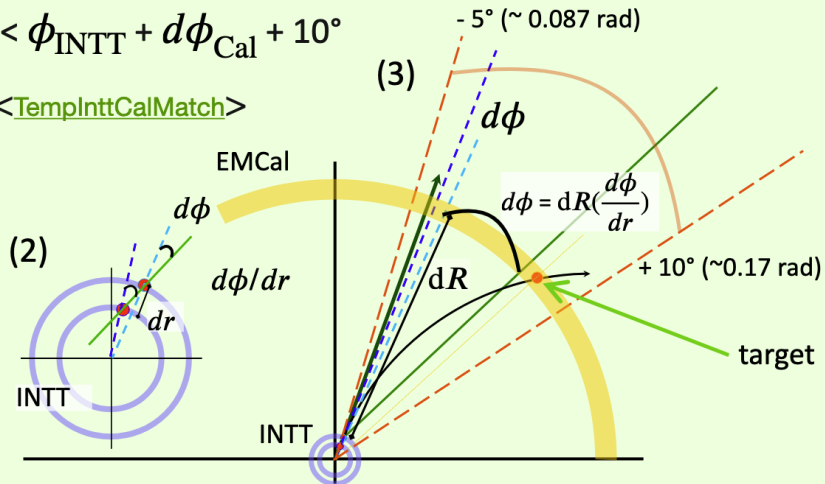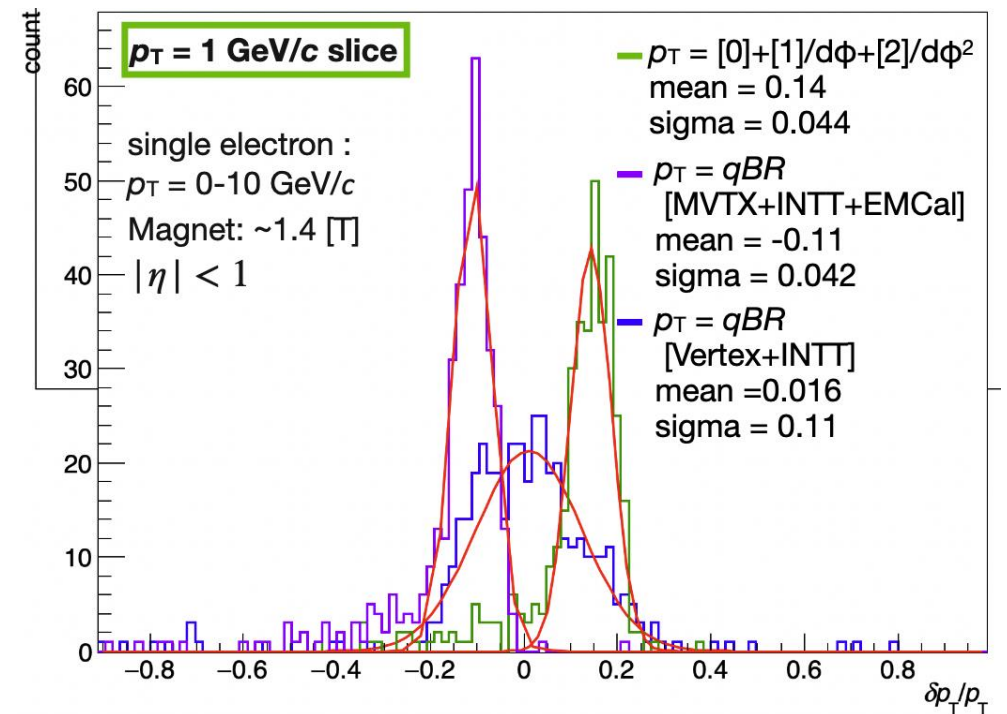# To Do List

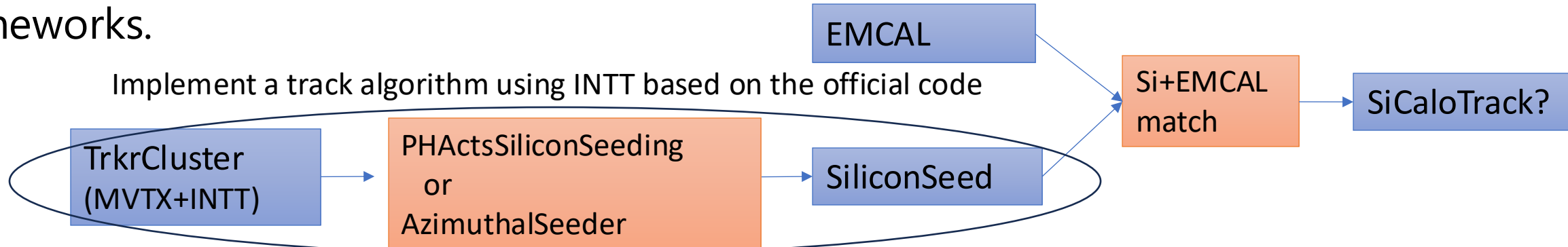- Calorimeter Clustering

- Simulation for other particles such as charged hadrons and muons

- Silicon tracking

- Vertex Finder
  - Identify events with multivertex? separate vertex from extended time.

- Optimize silicon-Calo matching

- Single electron simulation to extract L vs pT

Our goal is to make this framework one of the official tracking algorithm options for sPHENIX, so we need to develop the code in the same style as the existing frameworks.

Implement a track algorithm using INTT based on the official code

```
EMCAL
                                                    Si+EMCAL
                                                    match          SiCaloTrack?

TrkrCluster        PHActsSiliconSeeding
(MVTX+INTT)                or                SiliconSeed
                   AzimuthalSeeder
```

Meeting

Frequency: Every other Wednesday

Time: 2:00 PM in JST (24:00 in EST)

Indico

https://indico2.riken.jp/event/5165/