*Original activity by Lucien Cremaldi, University of Mississippi*

**Objective**

Find the relative abundances of pions, muons, electrons, kaons, and protons.

**Algorithm**

*See Event 1 on the accompanying page.*

1. Go to the table and start with track A. Find its momentum in MeV/c and the rate of the number of photons (nph) produced in the Belle II Time Of Propagation (TOP) detector.
2. Look at the TOP Cherenkov Photons plot. Locate the line or curve at coordinates defined by the momentum and the number of photons. In our first example, A from Event 1, 449.5 MeV/c and 22.9 photons meet where the muon (), pion () and electron (e) curves cross.
3. In the table, find the energy change per unit length dE/dx (keV/cm) in the Central Drift Chamber (CDC).
4. Go to the CDC dE/dx (keV/cm) plot and locate the line or curve at coordinates defined by the momentum and dE/dx. In example A, the coordinates again point to the muon, pion, and electron curves.
5. We must choose a particle that has a track touching the coordinates in both plots.
6. Here is a rule of thumb: when in doubt as to whether a track is a pion or something else it is most likely a pion. In Example A, the something else is a muon or an electron but we will guess the answer is…pion.
7. Do the same for tracks B-F in the table. (Example B in Event 1 is also done for you. Almost.)

References

* KEK: <https://www.kek.jp/en/>
* Belle II: <https://www.belle2.org/>
* TOP: <https://belle2.jp/top/>
* CDC: <https://belle2.jp/cdc/>

