First study of deltaPhiMax seed-finder parameter

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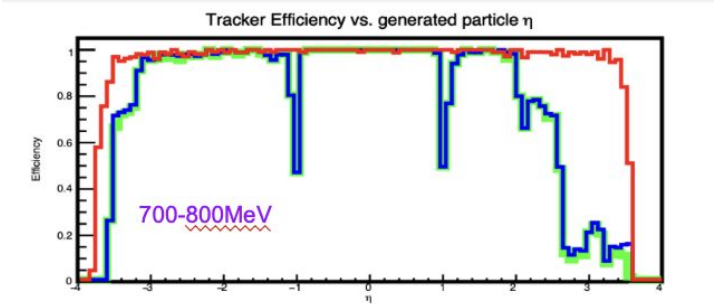
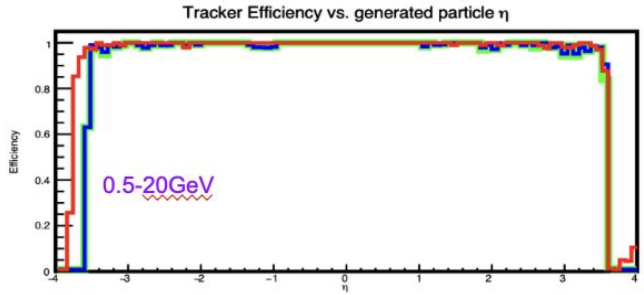
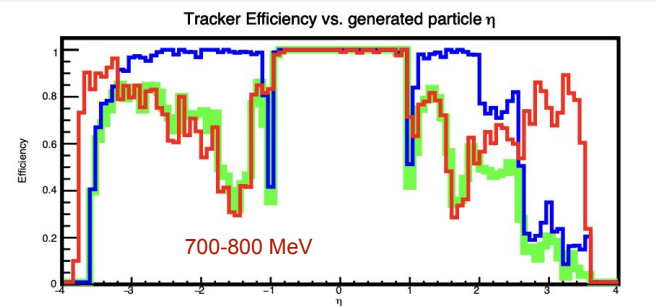
Old geant vs new geant version (nightly build from this week)

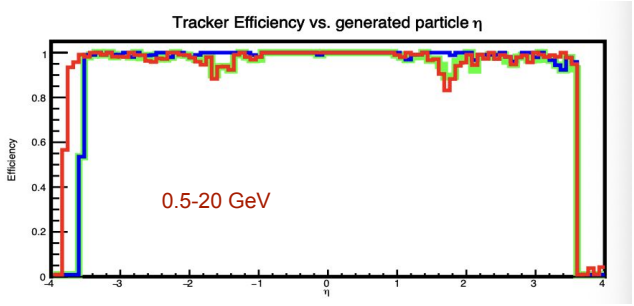
Old geant version





New geant version





- Truth Seeding
- Real seeding before ckf
- Real seeding after ckf

Negative muons produced at (0,0,0) with uniform eta distribution

Note:

a. Inefficiency in truth seeding with new geant version at eta around +-1.5

b. Inefficiency in real seeding persistent (next slide)

Some settings which we did not change from ACTS

In the previous slide, we notice inefficiencies for real seeding at eta around +-1. It comes from ACTS

https://github.com/acts-project/acts/blob/main/Core/include/Acts/Seeding/SeedFinderOrthogonalConfig.hpp#L80

```
/// Shrink the phi range of middle space-point (analogous to phi bin size in grid from default seeding + number of phi bins used in search)
  float deltaPhiMax = 0.085;
```

https://github.com/acts-project/acts/blob/main/Core/include/Acts/Seeding/SeedFinderOrthogonal.ipp#L83-L87

```
   * Cut: Shrink the φ range, such that Δφ_min ≤ φ - φ_L ≤ Δφ_max
  res[DimPhi].shrinkMin(pL - m_config.deltaPhiMax);
  res[DimPhi].shrinkMax(pL + m_config.deltaPhiMax);
```

Negative muon produced at (0,0,0) with p from 400-500 MeV

deltaPhiMax = 0.085;

```
root [2] events->Scan("CentralTrackSeedingResults.theta")
************************************
*    Row   * Instance * CentralTr *
************************************
*      0 *        0 * 1.3055162 *
*      1 *        0 *           *
*      2 *        0 * 0.7857285 *
*      3 *        0 *           *
*      4 *        0 * 2.1480135 *
*      5 *        0 * 1.5404099 *
*      5 *        1 * 1.5410660 *
*      6 *        0 *           *
*      7 *        0 * 1.5311615 *
*      7 *        1 * 1.5313199 *
*      8 *        0 *           *
*      9 *        0 * 2.6840045 *
*     10 *        0 * 2.1838867 *
*     11 *        0 *           *
*     12 *        0 *           *
*     13 *        0 *           *
*     14 *        0 *           *
*     15 *        0 *           *
*     16 *        0 * 1.5991216 *
*     17 *        0 *           *
*     18 *        0 *           *
*     19 *        0 *           *
*     20 *        0 *           *
*     21 *        0 *           *
*     22 *        0 * 0.3918802 *
```

deltaPhiMax = 0.25;

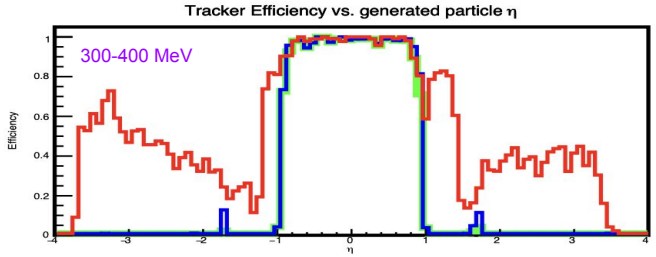
```
root [1] events->Scan("CentralTrackSeedingResults.theta")
************************************
*    Row   * Instance * CentralTr *
************************************
*      0 *        0 * 1.3020898 *
*      0 *        1 * 1.3044492 *
*      0 *        2 * 1.3027870 *
*      1 *        0 *           *
*      2 *        0 * 0.7857285 *
*      3 *        0 *           *
*      4 *        0 * 2.1504216 *
*      4 *        1 * 2.1504986 *
*      5 *        0 * 1.5400637 *
*      5 *        1 * 1.5404099 *
*      5 *        2 * 1.5404660 *
*      6 *        0 *           *
*      7 *        0 * 1.5310635 *
*      7 *        1 * 1.5311615 *
*      7 *        2 * 1.5313199 *
*      8 *        0 * 0.4133943 *
*      9 *        0 * 2.6851134 *
*      9 *        1 * 2.6840045 *
*     10 *        0 * 2.1859009 *
*     10 *        1 * 2.1861157 *
*     11 *        0 *           *
*     12 *        0 *           *
*     13 *        0 *           *
*     14 *        0 *           *
*     15 *        0 *           *
*     16 *        0 * 1.5975118 *
*     16 *        1 * 1.5977683 *
*     16 *        2 * 1.5978423 *
*     17 *        0 * 0.4897079 *
*     18 *        0 * 0.4979996 *
*     19 *        0 *           *
*     20 *        0 * 0.2738409 *
```

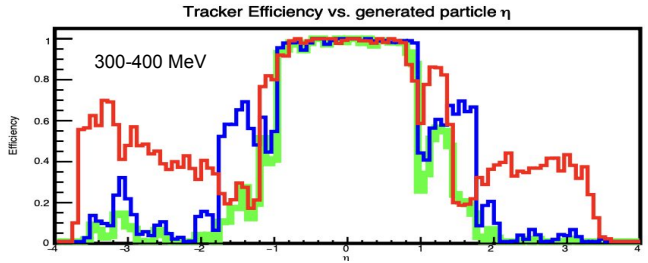
Observation:

1. Seeds formed for event 8, 17,18 at deltaphimax = 0.25
2. More # of seeds for each event
3. Some seeds are not formed event after increasing deltaphimax

deltaPhiMax = 0.085 (default)

deltaPhiMax = 0.25





Truth seeding
Real seeding
Real seeding after ckf