Readout Update for Processing Multi-type of Triggers

T. Cao

April 27, 2021

HPS MC Meeting

Introduction

- Previously, we process one type of trigger in readout per job. With update, readout is able to process multi-type of triggers simultaneously.

- Like experiments, we use TS bank to record status of the trigger list.

- For experiments, we have a TS system to set pre-scales for multi-triggers and send triggers based on pre-scales. For MC, we check if there is/are one or multi-trigger(s) sent by trigger readout driver(s) every event (2 ns) by the readout manager. If multi-triggers are sent, we only read out MC data one time to avoid the same events are read out repeatly, while all registered triggers are recorded by TS bank.

- We can arbitrarily add one or multi-triggers into a readout steering file based on requirements of analysis. Like experiments, TS bank will tell us what triggers are registered. During analysis, we can handle MC TS bank in the same way of experiments.

Software Updates

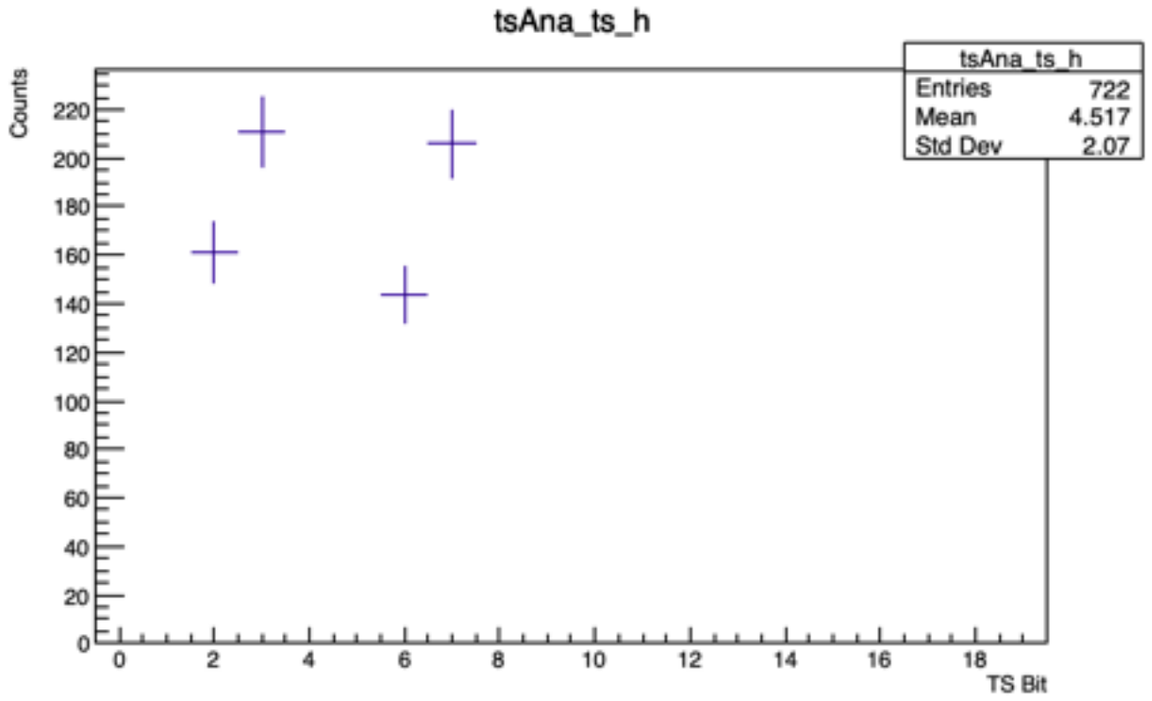
- Currently, the readout system includes singles, pairs, FEE and pulser trigger readout drivers for 2019 to process corresponding triggers, separately. These drivers have been updated for processing multi-type triggers.

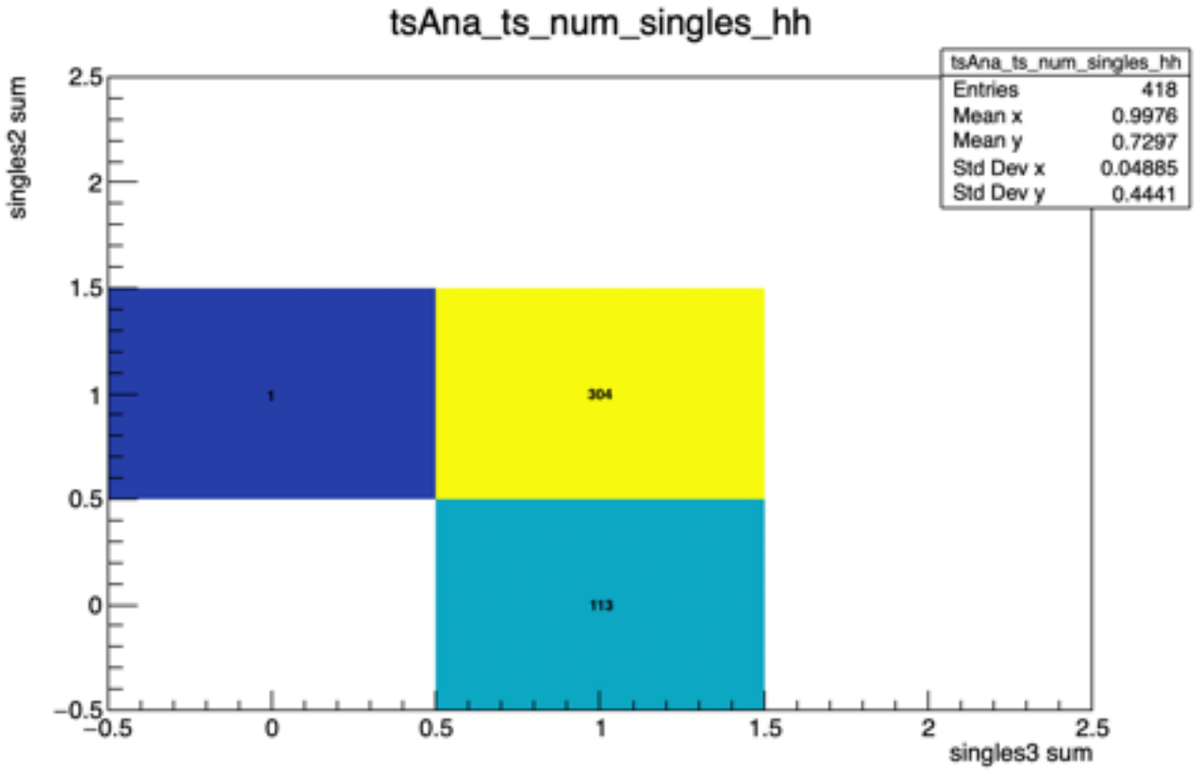
- A steering file “PhysicsRun2019TrigMultiSingles.lcsim” has been added into hps-java to process singles2 and singles3 triggers.

- Since DAQ configuration is automatically obtained from the DAQ management system, we do not need to set parameters in steering files by hand. Therefore, exiting steering files are easy to be extended by adding more trigger drivers to process more types of triggers.

Test

- MC sample: pure tritrig
- readout steering file: PhysicsRun2019TrigMultiSingles.lcsim (processing singles2 and singles3 triggers simultaneously)
- Run: 10666 -> hps_v12_1 DAQ configuration





- Count for single3 is larger than count for single2 since Emin and PDE cuts for single2 are tighter. It is consistent with experiment.
- # of triggered events by this steering file is almost the same as # of triggered events by our old steering file with only single3 trigger.