

Graphical Guide to Event Types, Prescaling, and EDTM

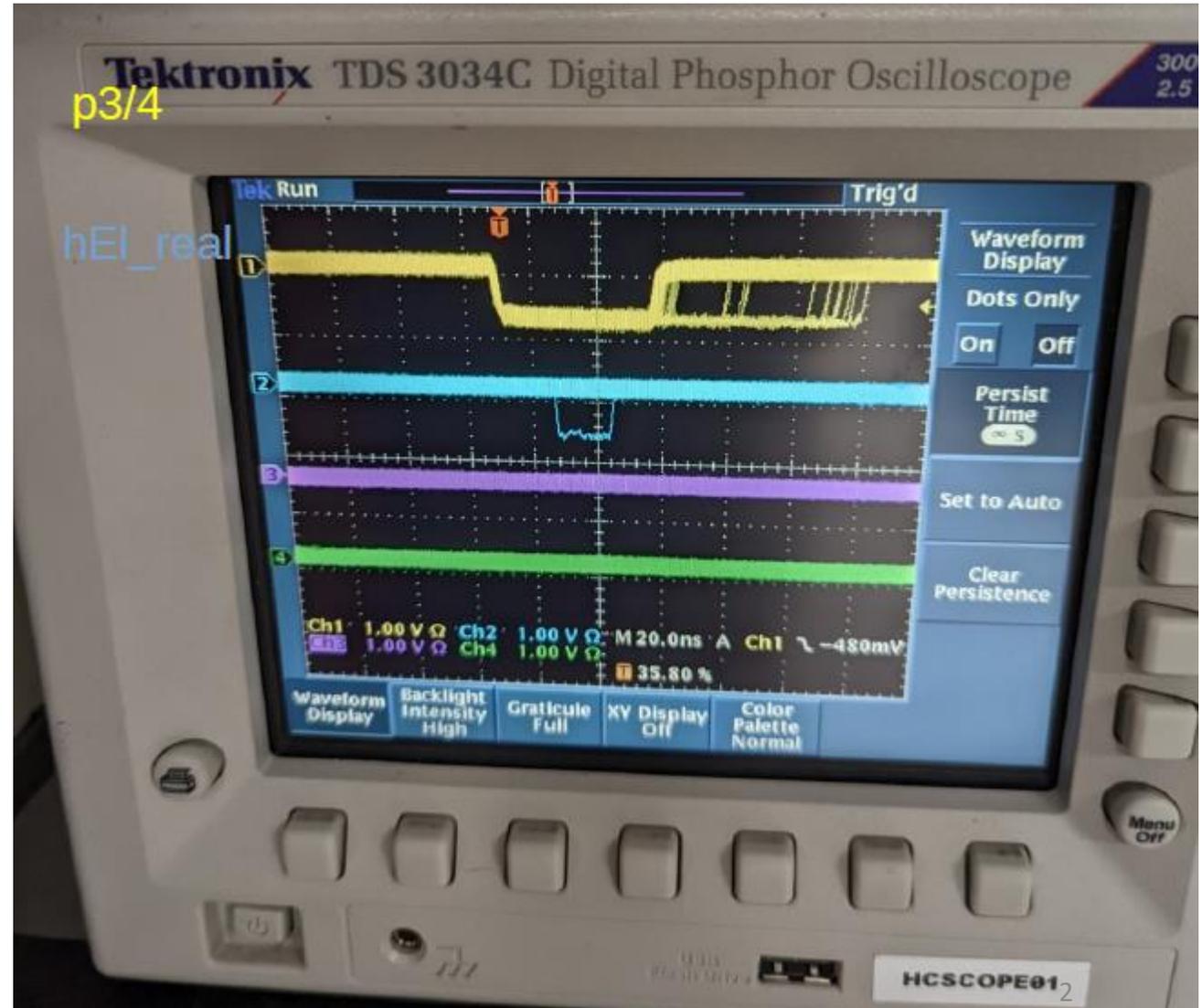
According to the Trigger Setup for PionLT 2021-2022 on the COIN DAQ

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2022/06/28

Event Timing

- Diagrams in this presentation show events as pulses similar to what is seen on an oscilloscope
- Remembering that pulses move left to right, the earliest pulse/event would be the one furthest to the right
- Note the DAQ viewing order in the appropriate slides

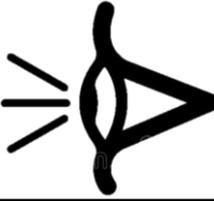


Trigger Types

pTRIG #, Trigger Bit Type, and Event Types

Pion-LT Triggers

DAQ Viewing-Order



 pTRIG1: $\frac{3}{4}$ trigger type bit 1

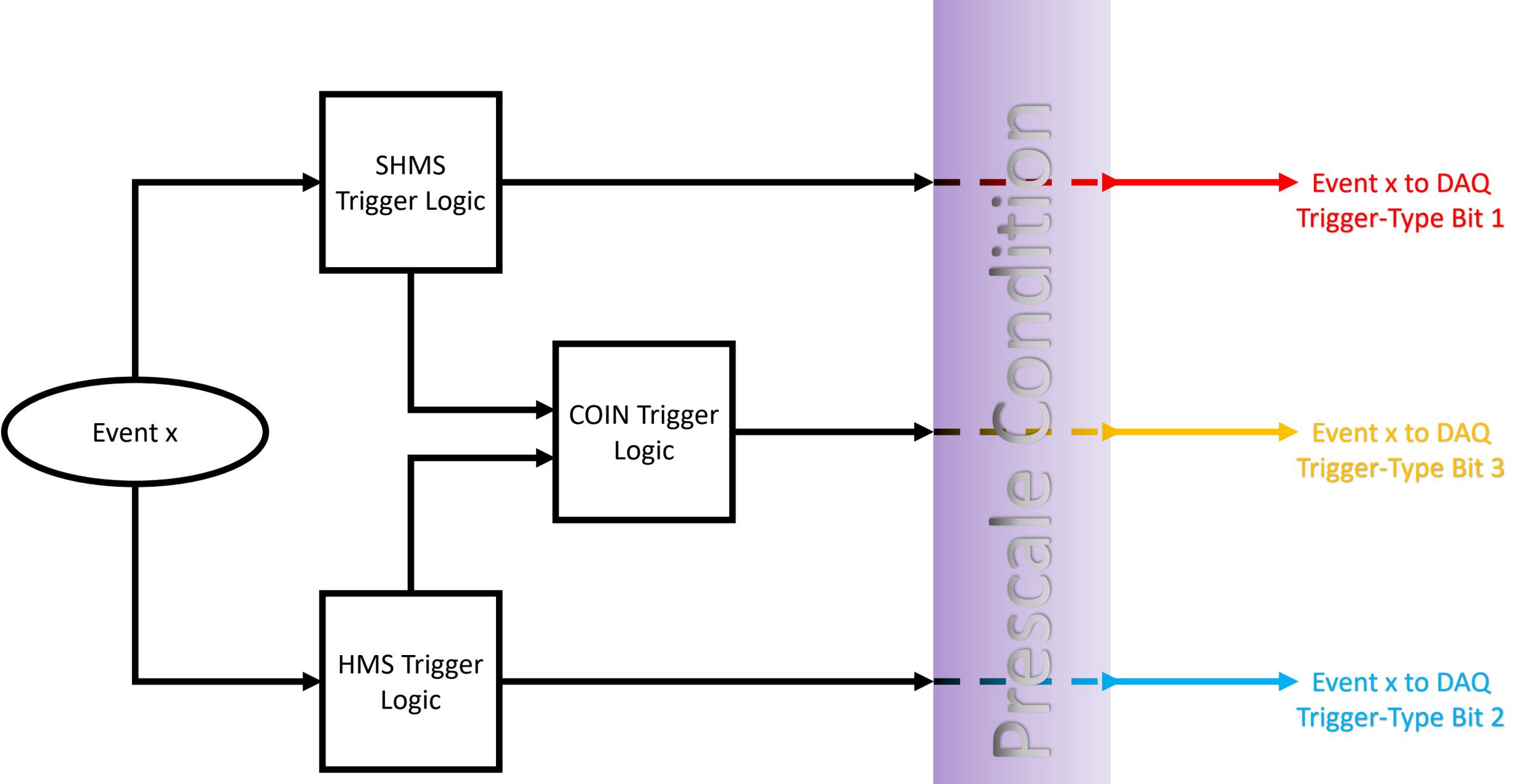
 pTRIG2: ELREAL trigger type bit 1

pTRIG3: $\frac{3}{4}$ trigger type bit 2 

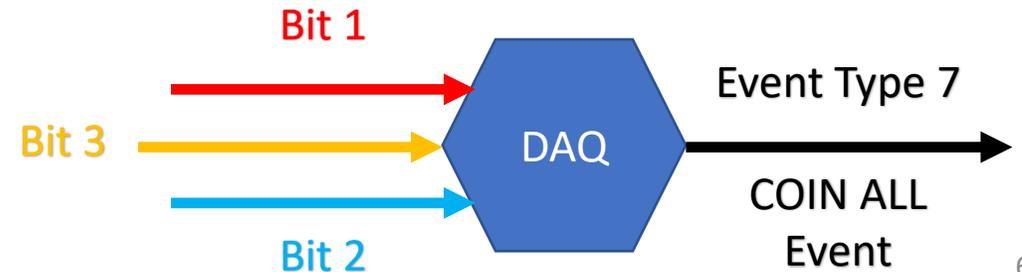
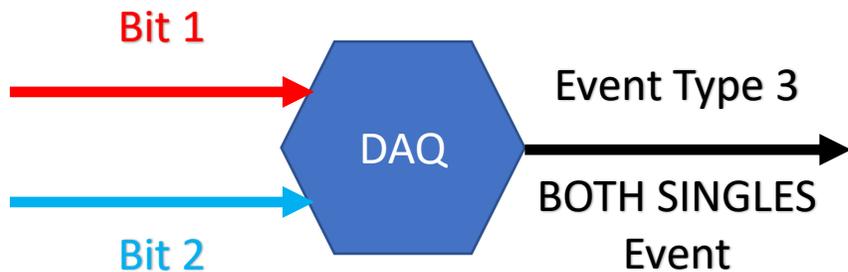
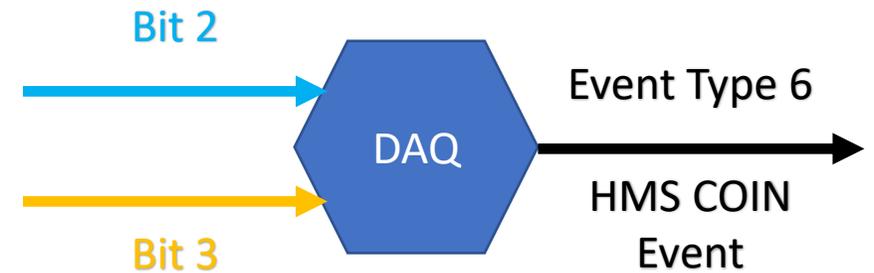
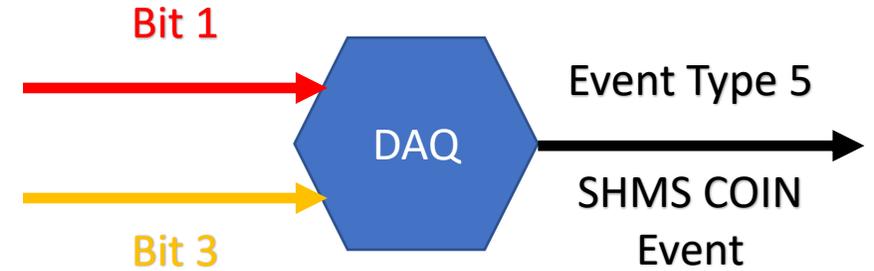
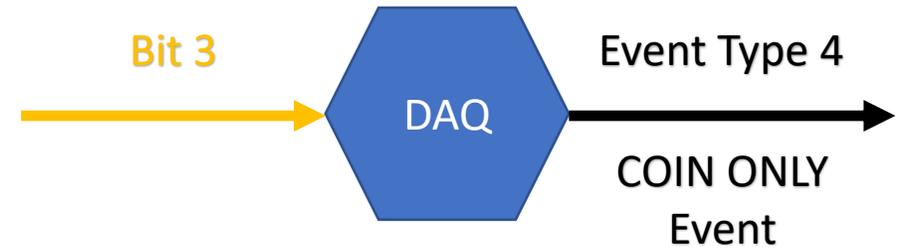
 pTRIG4: ELREAL trigger type bit 2

pTRIG5: $\frac{3}{4}$ +ELREAL trigger type bit 3 

pTRIG6: $\frac{3}{4}$ + $\frac{3}{4}$ trigger type bit 3 



A single event could have 0 to 3 different trigger-type bits, depending on each trigger's prescale condition at the time of the event.

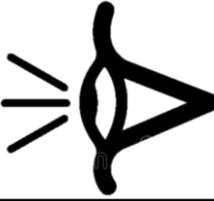


Event Type Examples

For events passing through multiple triggers

Event Type 3

DAQ Viewing-Order



$p^{3/4}$ & $h^{3/4}$



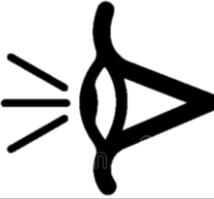
Event x: DAQ busy; not saved

Event x: saved as type 3



Event Type 3

DAQ Viewing-Order



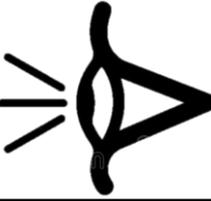
pELREAL & hELREAL

 Event x: saved as type 3

 Event x: DAQ busy; not saved

Event Type 3

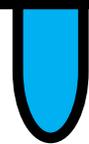
DAQ Viewing-Order



p^{3/4} & hELREAL



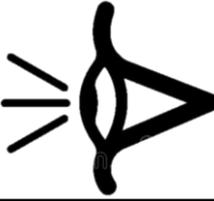
Event x: saved as type 3



Event x: DAQ busy; not saved

Event Type 3

DAQ Viewing-Order



pELREAL & h^{3/4}

 Event x: DAQ busy; not saved

Event x: saved as type 3 

Event Type 4

DAQ Viewing-Order



pTRIG 5



Prescale condition not met



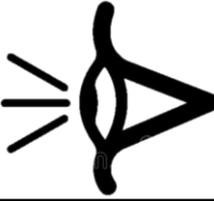
Prescale condition not met

Event x: saved as type 4



Event Type 5

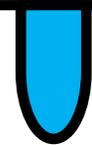
DAQ Viewing-Order



pTRIG 5



Event x: DAQ busy; not saved



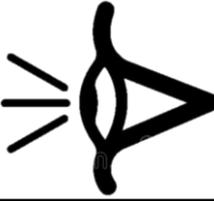
Prescale condition not met

Event x: saved as type 4



Event Type 6

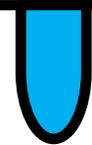
DAQ Viewing-Order



pTRIG 5



Prescale condition not met



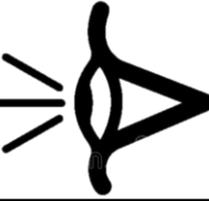
Event x: DAQ busy; not saved

Event x: saved as type 4



Event Type 7

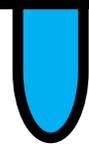
DAQ Viewing-Order



pTRIG 5



Event x: DAQ busy; not saved



Event x: DAQ busy; not saved

Event x: saved as type 4

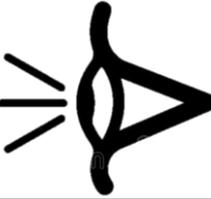


EDTM

Events, Pulses, and Types

EDTM Events

DAQ Viewing-Order



Always all triggers

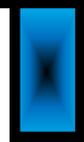


EDTM trigger type bit 1



EDTM trigger type bit 1

EDTM trigger type bit 2



EDTM trigger type bit 2

EDTM trigger type bit 3



EDTM trigger type bit 3

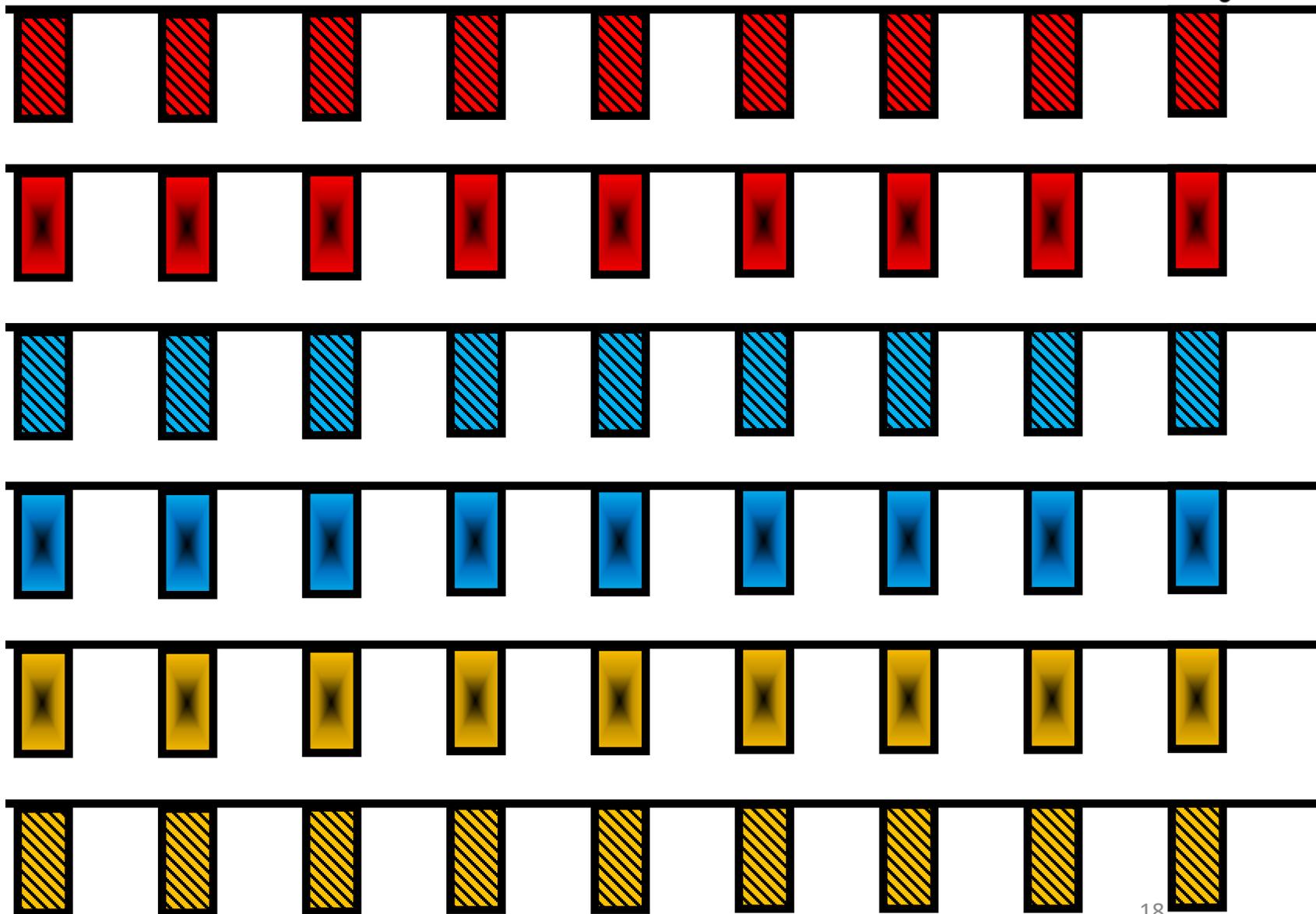


EDTM Pulses

REAL TIME DAQ Viewing-Order



- Evenly spaced pulses sent by pulse clock
- Trigger ordering still applies (not shown here)
- Have all trigger bit-types
- One EDTM pulse is one 'real' event
- Saves through only one trigger, like with physics event types 3-7
- EDTM events can be any event type



Deadtime and Prescaling

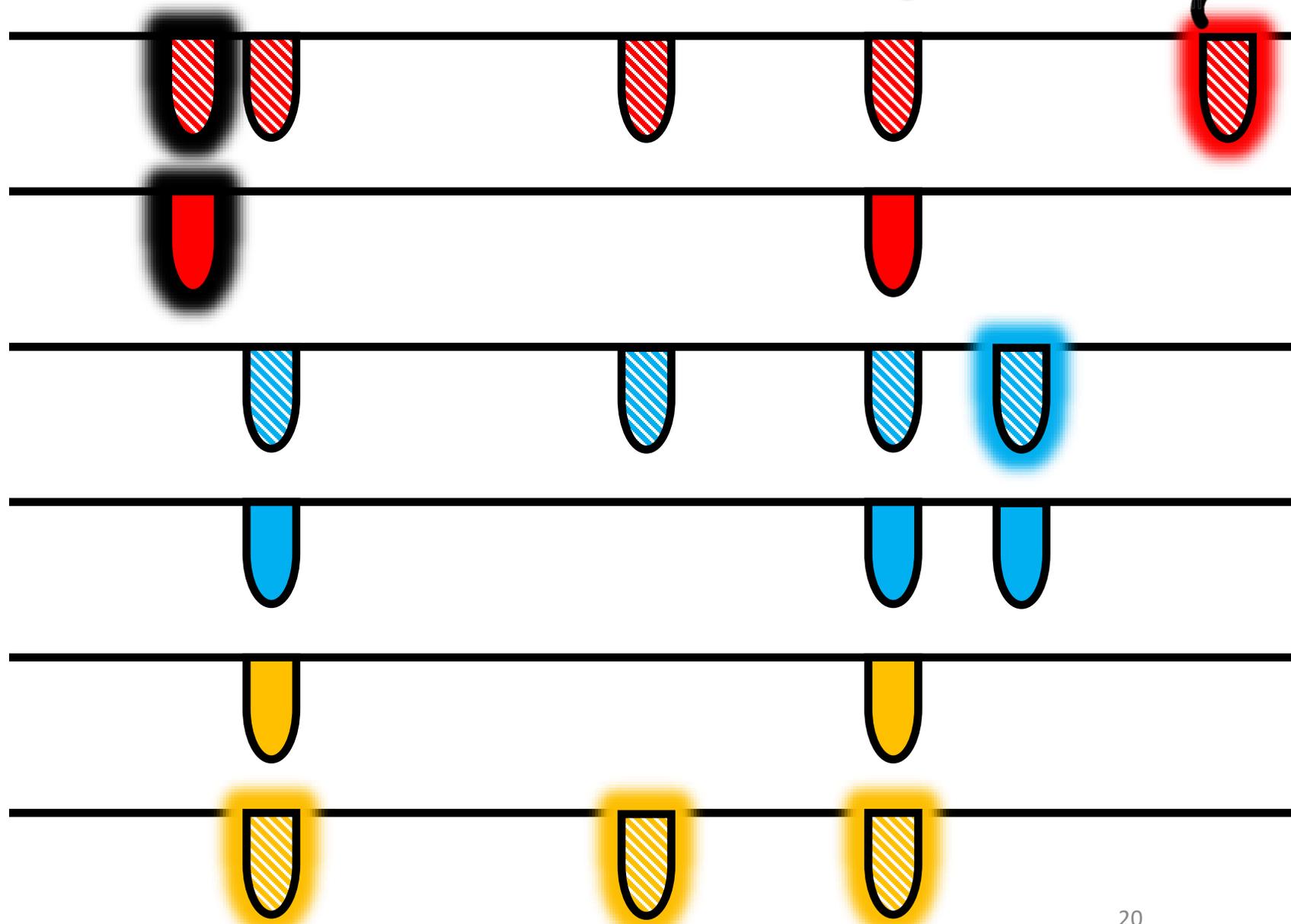
Accepted Events, Deadtime Events, Prescaled Events, and Events Seen in Multiple Triggers

Physics Events

REAL TIME DAQ Viewing-Order



- Timing is 'random' and based on physics rates rather than a clock
- Trigger ordering still applies (not shown here)
- COIN DAQ only saves one event through one trigger at a time
- If two events occur in rapid succession, the second may be lost to deadtime



Prescaling in Production REAL TIME DAQ Viewing-Order

PS1=2



PS2=-1



PS3=-1



PS4=1



PS5=0



PS6=-1



Event Type 2

Event Type 4

Event Type 1

Event Type 6

Prescaling EDTM

REAL TIME DAQ Viewing-Order



PS1=2



PS2=-1



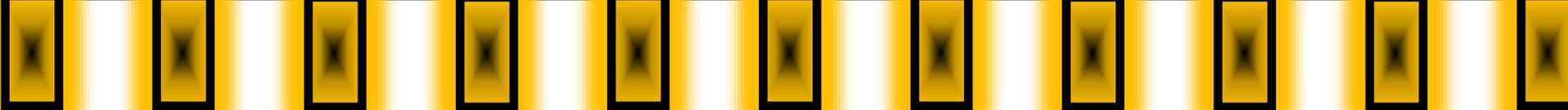
PS3=-1



PS4=1



PS5=0



PS6=-1



Event Type 4 Event Type 6 Event Type 5 Event Type 6 Event Type 4 Event Type 7 Event Type 4 Event Type 6 Event Type 5 Event Type 6 22Event Type 4

Prescaling EDTM

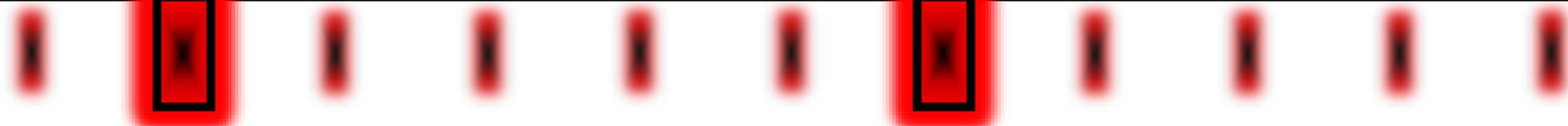
REAL TIME DAQ Viewing-Order



PS1=-1



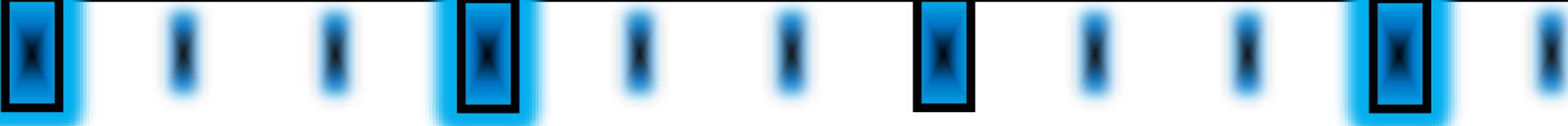
PS2=3



PS3=-1



PS4=2



PS5=-1



PS6=-1



Event Type 2

Event Type 1

Event Type 2

Event Type 3

Event Type 2

Physics and EDTM

REAL TIME DAQ Viewing-Order



PS1=2



PS2=-1



PS3=-1



PS4=1



PS5=0



PS6=-1



Event Type 6

Event Type 1

Event Type 4

Event Type 7

Event Type 5

Event Type 2
Event Type 4

Event Type 7