8/27/03 Trigger Meeting Summary
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This is what we have now in the trigger, listed by scaler label (N.B. CODA trigger types count from 1 to 8, where the scalers count from 0 to 7). Unless explicitly noted, the Cerenkov and neutron counters are always "don't care" (i.e., never explicitly required or explicitly excluded). All include L/R interchange (except the singles PHYS5 and PHYS6).

Scaler	Detectors	Comment
PHYS0	1 TOFL AND 1 TOFR	Selected combinations, ep elastic kinematics "(e,e'p), (e,e'd), (e,e'pi)"
PHYS1	1 TOFL AND 0 TOFR AND neutronR	"(e,e'n)"
PHYS2	1 TOFL AND 1 TOFR	The combinations not covered in PHYS0
PHYS3	2 TOFL AND 0 TOFR	"(e,e'pi)n and (e,e'npi)"
PHYS4	2 TOFL AND 1 TOFR	"(e,e'ppi)"
PHYS5	1 TOFL	Left singles (prescaled in Trigger Supervisor)
PHYS6	1 TOFR	Right singles (prescaled in trigger supervisor)
FLASH	flasher photodiode	For monitoring timing shifts

We talked about several problems we have with this setup, and some features that are missing:

- PHYS3 counts at a rate 5 times that of PHYS0, and yet most of those triggers are not interesting. The dead time for PHYS0 went from 5% to 20% once we added PHYS3. Chi found that about 50% of these triggers have neighboring TOFs fire.
- The 0 TOF sector could require the neutron, dropping the rate considerably (Chi saw a factor of 1000), but then perhaps some events of interest would be lost.
- We might want to explicitly include the Cerenkov in some of the triggers, but also keep the "no Cerenkov" case (prescaled, so the rate doesn't kill us).
- The Trigger Supervisor can handle up to 12 trigger types, but the way we set up the inputs to it, there would be a lot of work to go beyond 8 types.
- We may want to accept events with more than 1 TOF in each sector. In fact, for TOFs 4-15 we already do accept some in hardware, since those are paired before the sector MLU.

The plan is to revise the above list, involving reprogramming the sector and cross MLUs. We will also OR the logic signals from all the Cerenkov boxes in a sector, so that it is easier to explicitly require a Cerenkov in a trigger. Right now the 4 Cerenkovs come into the trigger independently, since we had thought to require a coincidence between a Cerenkov and one of the 4 TOFs in front of it. Experience has shown we don't need to be that restrictive, and multiple Cerenkov boxes rarely fire (less than 5% of events where at least 1 box fires). With 4 input bits, there are 16 cases to enumerate for each TOF/neutron trigger pattern; better to OR the boxes and save the sector MLU bits for other uses. A special cable needs to be made to do the OR.

Karen will work on the MLU bit pattern programming, and make sure that the new event types don't require the same input pattern to be programmed to two different output patterns. The revised MLU programming will be tested briefly before the shutdown for ABS sextupole installation. This revised trigger list will be used regularly after the shutdown.

Scaler	Detectors	Comment
PHYS0	>0 TOFL AND >0 TOFR	At least one charged particle per sector
PHYS1	>0 TOFL AND 0 TOFR AND neutronR	"(e,e'n), (e,e'npi) with e and pi in same sector"
PHYS2	>1 TOFL AND CERL AND 0 TOFR	At least 2 charged particles in a sector, one of which is an electron
PHYS3	>1 TOFL AND 0 TOFR AND 0 neutronR	Prescaled; includes some of old PHYS3
PHYS4	not used	
PHYS5	(1 TOFL AND 0 CERL) OR (1 TOFR AND 0 CERR)	Sector singles NOT electrons (prescaled in Trigger Supervisor)
PHYS6	(1 TOFL AND 1 CERL) OR (1 TOFR AND 1 CERR)	Sector single electrons
FLASH	flasher photodiode	For monitoring timing shifts