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***Electronics/DAQ sub working group for the
EIC yellow report***

Temple workshop

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Remarks on front-end part

Strongly depends of kind of detector to read

Amplitude and shape of the signals, dynamics of the signals, detector capacitance, number of channels

Measurement to be done: amplitude, timing, position (barycenter of channels), etc...

What resolution for each kind of measurement ? What peaking time ? What expected rate per channel ?

What context ? Particle fluxes, electronics occupancy, electronics noise level

What DAQ trigger scheme ? Hard/soft trigger, continuous read-out, etc...

Hardware aspects

A lot of existing chips: amplifiers/shapers, digitizers, analog and digital buffers,...

Will be obsolete in 10 years, but can be base of development for future EIC read-out

Choices to study there: new ASICs ? IP in FPGA ? Integrated analog + digital chips ?

Electronics directly integrated into detectors ?

First steps to reach

Overview on kind of detectors to read → inputs from detector WG

→ request for information sent to them (cf next slide)

Foreseen experimental conditions (physics and background rates, particle multiplicities, event sizes, etc...)

→ information expected from physics WG

Summarize state of the art on read-out electronics: existing chips for each kind of detectors, foreseen evolution, projects of future read-out chips

→ 1 page summary for each chip, or electronics integrated in detector

Needed information for each considered detector

Information about the detector

Kind of detector: gaseous, solid (silicon, other), scintillating (fibers, slabs,...), calorimeters, etc...

Characteristics of the signals: amplitude, capacitance, intrinsic noise,...

Foreseen number of channels

Estimation of average and peak rate per channel at nominal EIC conditions

Estimation of background level: physics background, low energy particle radiation,...

Detector read-out

Data to be acquired for each channel: hit time, hit amplitude, digitized waveform,...

If a type of front-end electronics is already considered for the read-out

If a front-end electronics is already integrated in the detector structure (→ specific page to fill)

Environment of electronics: magnetic field, temperature, pressure

Needs about time synchronization, resolution of time synchronization

Remarks

Early stage of the WG studies → we don't expect precise numbers, but first estimate would be important to start to discuss on possible front-end solutions

Willing to work together with detector WGs on definition of the front-end electronics