eRD16: Forward/Backward Tracking at EIC using MAPS Detectors

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In its initial proposal in Summer 2015, eRD16 proposed the conceptual development of a backward (electron-going direction) tracking station for use near the EIC collision vertex. This tracking station concept is anticipated to consist of an arrangement of disks of thinned-silicon sensors (MAPS) detectors, including concept design for the arrangement of services; cooling, power, and readout. Simulations are to specify the layout and sensors optimized for high priority early physics measurements at an EIC. They are to determine also whether a similar tracking station concept should be used in the hadron-going direction and, if so, how it should be re-optimized in view of the differing physics demands. In addition, R&D was proposed on low-mass cabling utilizing aluminum traces to minimize mass.

The EIC Detector Advisory Committee strongly encouraged carrying out the simulation studies leading to the design of the forward and backward tracking detectors. This part of the proposed effort was awarded partial funding.

At the time of the writing of this note, we have attracted a UC Berkeley student who will join the simulation effort in February and hope to soon conclude a search for a postdoctoral researcher to participate as well. Sufficient administrative progress has been made to enable the actual transfer of funds for part of the proposed effort. The simulation effort with the toolkit developed by the BNL task force for the EIC is thus still to begin in earnest. Independent standalone tools to confirm (or refute) aspects of this work have been identified. Synergies with the ongoing construction of the ALICE-ITS upgrade have lead to some progress on the development of low-mass cabling. New aluminum conductor cable prototypes with lengths between 21 and 48cm have been obtained from the Kharkov Institute of Physics and Technology and from Hughes Circuits Inc. We have performed dimensional and visual QA, as well as preliminary electrical tests and tests of “solderability”. Sideways related to the proposed R&D, we note that the ALPIDE-1 analog and digital latch-up cross sections were measured at the LBNL 88” cyclotron.