

**Subject:** [Eic-projdet-tic-l] TIC meeting 5/13, 2024 (TDR effort, progress (B0, el/r-o/DAQ);

photosensors for Cherenkov PID) - main outcome

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Dear Colleagues,

this e-mail is to underline the main outcomes of the May 13 TIC meeting, dedicated to (i) TDR effort, progress (B0, el/r-o/DAQ) and to (ii) photosensors for Cherenkov PID.

The careful reports by the speakers have been appreciated.

In the initial communications, updated timelines of the ePIC TDR effort have been shown: the 2024 goal is a draft of the pre-TDR by the end of the year. This draft will also be used in support of the DOE OPA review in early January 2025.

These timelines are now posted in the TIC meeting INDICO page.

(i) TDR effort, progress (B0, el/r-o/DAQ)

B0 detectors

It has been underlined that, on the TDR time scale, no dedicated studies laboratory/testbeam /prototyping

studies are possible and support will come from the studies of AC-LGAD from RP/OMD program and crystal calorimetry with ZDC.

About AC-LGAD the relevance of using charge sharing to obtain the required space resolution is underlined.

About the ECal, the need of long (~ 20 cm) crystal to cope with high energy gammas is underlined.

The baseline is PbWO4 crystals, which implies soft photon performance challenges;

Thanks to their performance for low energy photons, LYSO crystals are still being considered, if they can be obtained with reasonable size and cost.

Installation and integration remain key issues for the B0 detectors.

Electronics/Read-out/DAQ

The Electronics and DAQ PDR #2 is scheduled on June 10-11.

The agenda is being finalized. It will include final design review for IPGbt / vtrx+ in view of including these items in LLP (CD3-B).

Progress is registered in determining the data volume, with some remaining open issues:

RICH detectors; Far Forward / Far Back (work in progress by detector groups);

Synchrotron Radiation; Noise (need thresholds > 4-5 sigma), thresholds increase with radiation damage.

The status of ASICs is updated. For MCP-PMT-like sensors, the usage of FCFD or EICROCx remains an open point; in any case, space requirement can be below 10 cm for both options. The OMEGA group will be contacted about the possibility of developing 3 ASICs (CALOROC, EICROC and EICROCx) in accordance with the project timelines. Six RDO boards have been fabricated by the end of April, as expected (ppRDO). Progress in FELIX 155 and GTU are reported. A compilation of detector slow control requirements has been started.

## (ii) Photosensors for Cherenkov PID

SiPMs for dRICH.

Abundant further studies ongoing. Here only highlights are reported.

The most recent rate studies indicate an increase of neutron fluence in the dRICH SiPM region of a factor

almost 20, imposing revisited strategies to preserve SiPMs with tolerable dark count rates.

The SiPM window by Si resin loses transparency when heated in situ at 175 degrees (but not in oven).

Environmental effect? How when in pure N<sub>2</sub> atmosphere? Heating at max 150 degree, where no transparency loss is detected, should be equally effective. Further studies ongoing.

New SiPMs from Hamamatsu (not yet commercialized) have been tested.

they show lower dark count noise for the same PDE; the effective spectrum moved towards UV also thanks to quartz windows.

Commercial MCP-PMTs (baseline for hpDIRC).

The panorama is restricted to Photech devices.

Preparatory work to have them characterized in Edinburgh is ongoing.

HRPPDs are still regarded as an alternative option.

HRPPDs for pFRICH.

Sever HRPPDs have been delivered and basic quality assessment started.

Globally, good performance (QE, gain, time resolution). Setup for QE are organized/ are being organized

at Jlab, BNL and Yale.

Comparative tests will be performed in Edinburgh, ageing at INFN.

Engineering issues persisting (HV contacts, screws to fix the interposing plane between the detector and the FEE, photocathode coating).

Important progress, but robust characteristics suitable for mass industrial production are still far.

If this notes need corrections/integration, please, write me back.

Thank you.

Best greetings, Silvia

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