Subject: TIC meeting , August 19, 2024 (TDR effort, progress (tracking); uRWELL-BOT resolution) - main outcome
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Dear Colleagues,

please, excuse the delay in producing these notes: I was traveling during the past week.

This e-mail is to underline the main outcomes of the August 19 TIC meeting, dedicated to (i) the update about pre-TDR effort (tracking) and
(ii) uRWELL-BOT resolution.
For both items, the careful reports by the speakers have been appreciated.

An improvement of the TIC meetings was decided, giving the opportunity for quick communications both from TC-office and from the DSCs.
Communications on August 19:
- from TC-office: The BNL Media Office is seeking interesting stories coming out of the various working groups supporting and contributing to the realization of the EIC.
- from FF: important ad advancement in physics studies with the proposed configuration of the ZDC (~7cm LYSO crystals, followed by a hadronic section like the LFHCAL-insert); ready to request a recommendation; a testbeam with Ac-LGAD samples in preparation.

(i) The update about pre-TDR effort (tracking)
The updates focus is on Tracking/Vertexing software developments for the pre-TDR. They include: completed jobs (the update to MPGD inner barrel geometry;
the implementation of hit-based track to MC particle matching) and work in progress (the update of the primary vertex finder/fitter to use real-seeded tracks; the addition of hits from first layer of the Barrel Imaging Calorimeter into the track reconstruction; updates to seed-finder parameters; the implementation of pixel noise and dead area in the SVT detector).
Moreover, three benchmark sectors are either implemented or under development:
1. Benchmark for single-particle tracking performance.
2. Benchmark for tracking in DIS / min-bias events
3. Benchmark for primary vertexing performance.

(ii) uRWELL-BOT resolution
This topic was discuss via 3 reports.

1. Tracking requirements for hpDIRC have been summarized. The most demanding

case is pi/K separation at 3-sigma level at 6 GeV/c, where an angular resolution (both in theta and phi) of 0.5 mrad is requested. Space information is also relevant, but with relaxed resolution (~ 1 cm).

2. uRWELL-BOT - status of the R&D.
A large size prototype is expected by the end of 2024 to be validated in a testbeam at FNAL in Summer 2025.
A mechanical model for the installation of uRWELL-BOT units
by inserting the trackers from the hadron side has been worked out.
The pro.s and con.s of thin gap (1 mm vs 3 mm) and different gas mixture has being summarized.
A new concepts to be tested to enhance performance is under consideration:
Random HV segmentation of both GEM and μRWELL and
higher hole density (pitch 100 μm instead of 140 μm).
For the 2D (U-V)-strip capacitive-sharing readout, 2 options
are under consideration: The ASACUSA-like R/O design (preferred:
Equal U-V charge sharing guaranty and perfect one-to-one matching with pads,
but requiring large vias, which are a fabrication challenge)
and the more traditional COMPASS-like R/O design.
The needed infrastructure for construction (clean room) is being prepared at JLab.
Points of particular attention:
From the Project: define soon the gas mixture (and related requirements); investigate if a single gas mixture can be used by all MPGD in ePIC.
From the DSC: the need that the time resolution requirement for uRWELL-BOT is defined.
From the TC-office: still several open options (thin gap, gas mixture, 2D R-O scheme).

3. μRWELL-BOT Simulation Update
Studies performed:
- Drift gap dependance: (i) space resolution: negligible difference at eta=0,
from 240 um (1 mm gap) up to 520 um (gap 3mm) at maximum eta; angular resolution: no dependance on the gap;
- Fast Simulation: (i) comparisons as sanity check: consistent results obtained; (ii) direct study of multiple scattering,
which is a factor ~ 10 higher for the polar angle respect to the azimutal angle.
- ACTS Track States: it has been demonstrated that track residual improve using the smoothed track state.
- Fast Tracklets: no improvement observed, degradation for phi.
NEXT steps:
- Study the impact of BIC tracking layer on the angular resolutions
- Reversing the track finding direction in EICrecon (for the specific needs of resolution for the DIRC)
- Assess tracking performance with more refined set of DIRC requirements, e.g. needed tracking resolutions vs. momentum and eta.

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

Best greetings, Silvia

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