

# TDR Readiness - Low-Q2 Tracker

April 22, 2024

TIC Meeting

# TDR Readiness - Low-Q2 Tracker

1. The lab/test beam/prototyping needed
2. The further progress needed for the reconstruction software
3. The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature
4. The studies required to demonstrate the detector performance
5. The required engineering design
6. The needed resources to achieve 60% (CD-2) and 90% (CD-3) design completion
7. The plan should include the time required to draft the text for the pre-TDR (CD-2) and TDR (CD-3)

## Current Status:

- Timepix4 systems in Glasgow lab

## Plans 2024:

- April-June: Carry out lab tests
- Summer (June/July): Standalone DAQ, small telescope beam tests at Mainz/Bonn tagger – Verify rate capabilities, charge sharing and time resolution
- December: ePIC DAQ integration in JLab Hall D tagger Hall
- Refine carrier board design

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## Current Status:

- Reconstruction carried outside of main branch in ePIC framework and in a standalone Geant+reconstruction package
- Calorimeter included only in the standalone package (track-calorimeter matching, energy resolution, timing capability)

## Plans 2024:

- April-June: Merge reconstruction into main branch - Provide necessary supporting workflow for updating neural network, tracking and current standalone ML algorithm
- April-August: Improve methods to handle time frame data
- May-August: Streamline beamline parameters handling and full background integration

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## Current Status:

- Very basic digitization carried out in reconstruction
- Charge sharing between pixels taken into account in standalone clustering, estimation of order 1.5 hit pixels per interaction for DAQ rates

## Plans 2024:

- April-August: Development of digitization step before reconstruction required – response will be based on discussions with other experts, literature and our own tests

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## Current Status:

- Single-particle and bunch crossing (multi-particle Brem+photoproduction) events tested
- Reconstruction acceptance, resolutions, efficiency and purities measured in simulation

## Plans 2024:

- Full background (Brem+SR+beamgas) over time scale of detector integration time needs to be considered, reproducing measurements. Coordination on SR with BG group
- Updated methods need to be tailored to accommodate findings
- Properly background weighted physics analysis to determine the effective reach of the detector - unlikely this will be possible before TDR – Need additional progress/manpower on generator-afterburner-merger steps

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## Current Status:

- Current beampipe and magnets setup is subject to change due to change in B2eR dipole (warm magnet instead of superconducting)
- Simple detector cooling design modeled

## Plans 2024:

- New input on machine design will be provided when it is ready
- Redesign the far-backwards vacuum system - change is likely in energy acceptance of the taggers
- Need significant support from project to settle on a design which minimizes beam impedance and SR without compromising the detector
- Develop and test more detailed detector cooling model

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## Current Status:

- UK grant for hardware was approved, new manpower at CTU
- Approximate schedule was shown in the slides

## Plans 2024:

- TDR design is coupled to IR layout, changes are likely in acceptances/resolution