

eHe3 spectator tagging update: Issues with samples and temporary workaround

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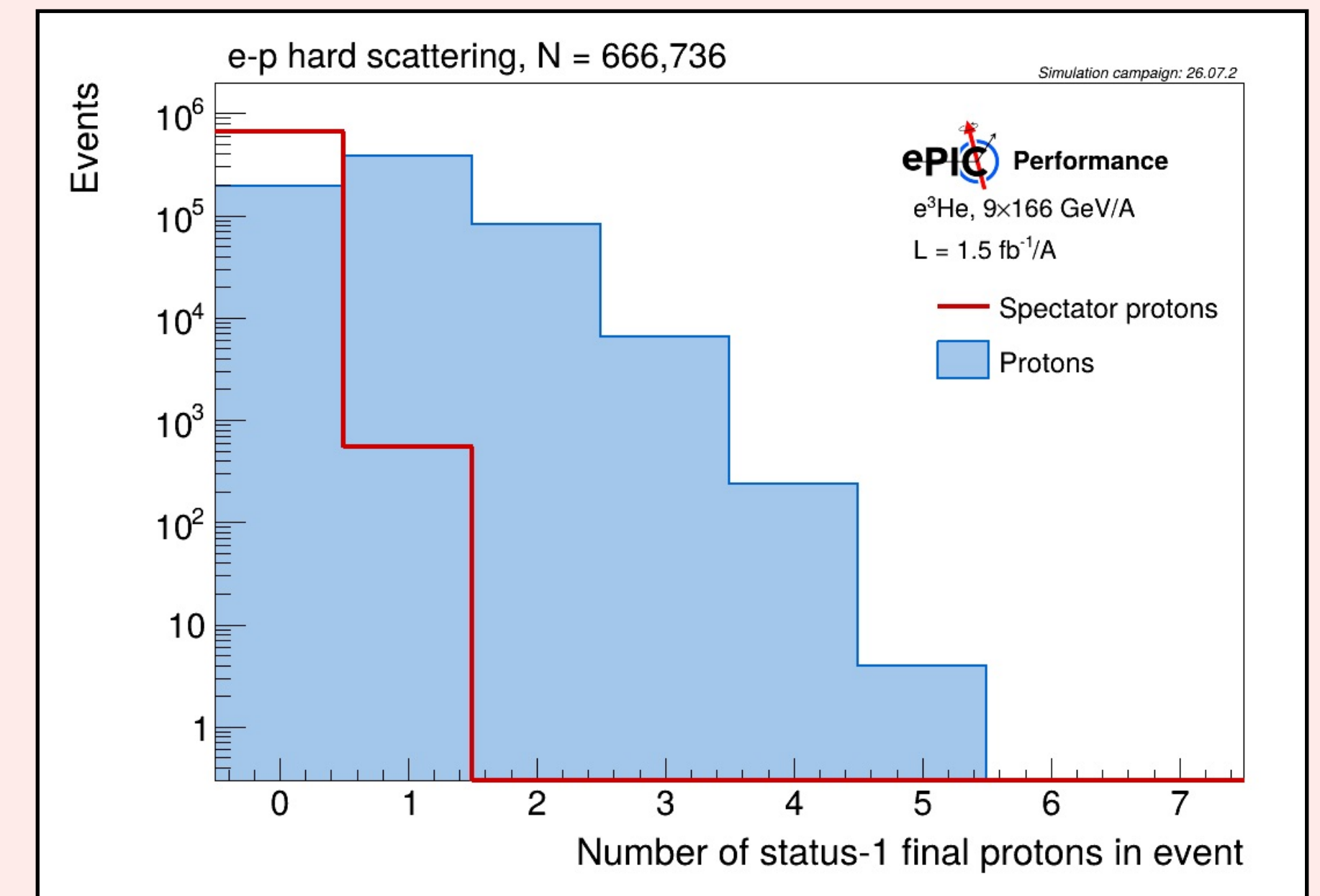
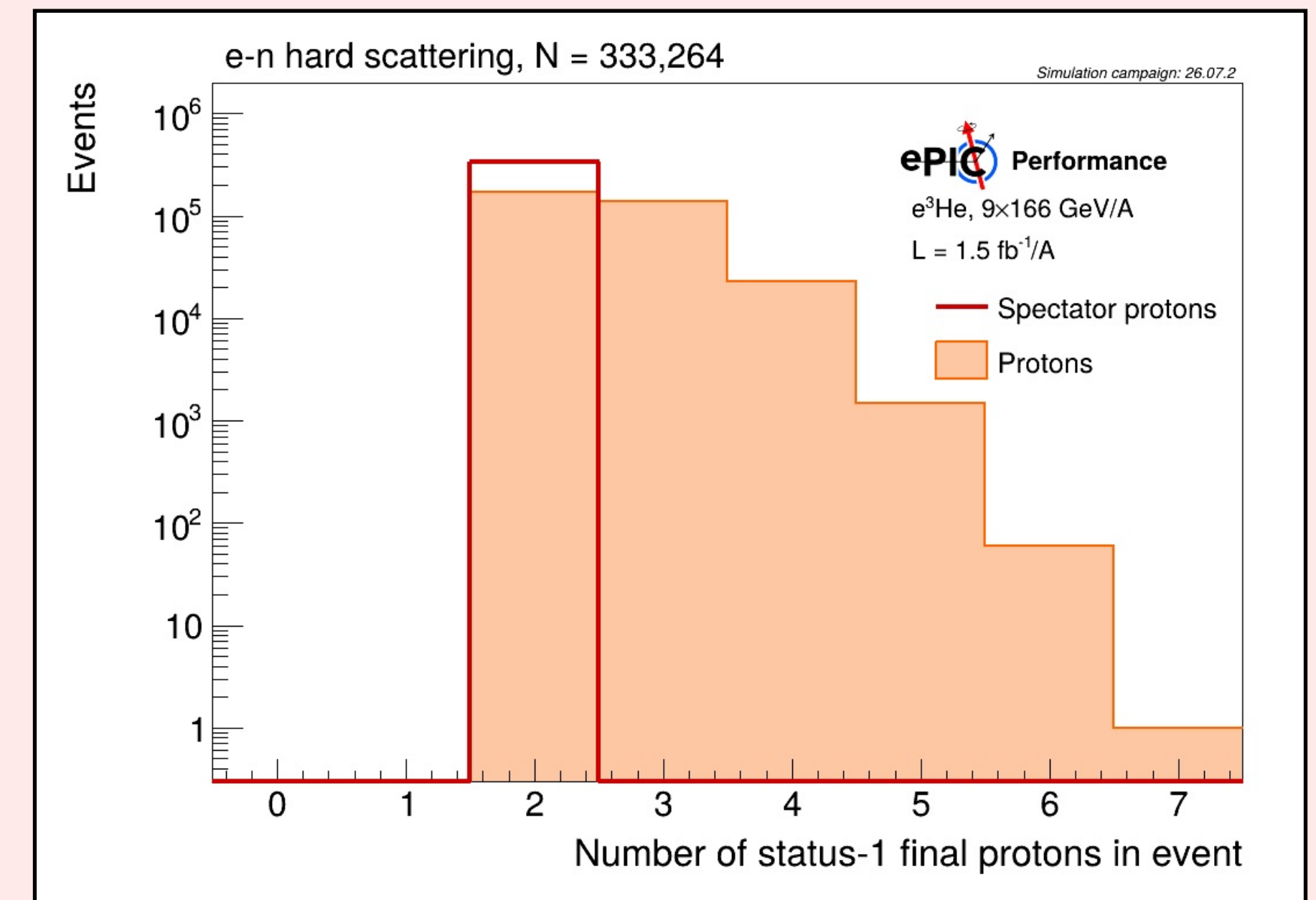
EDT working group meeting, 09/21/2026



Current issue with spectators in eHe3 BeAGLE samples

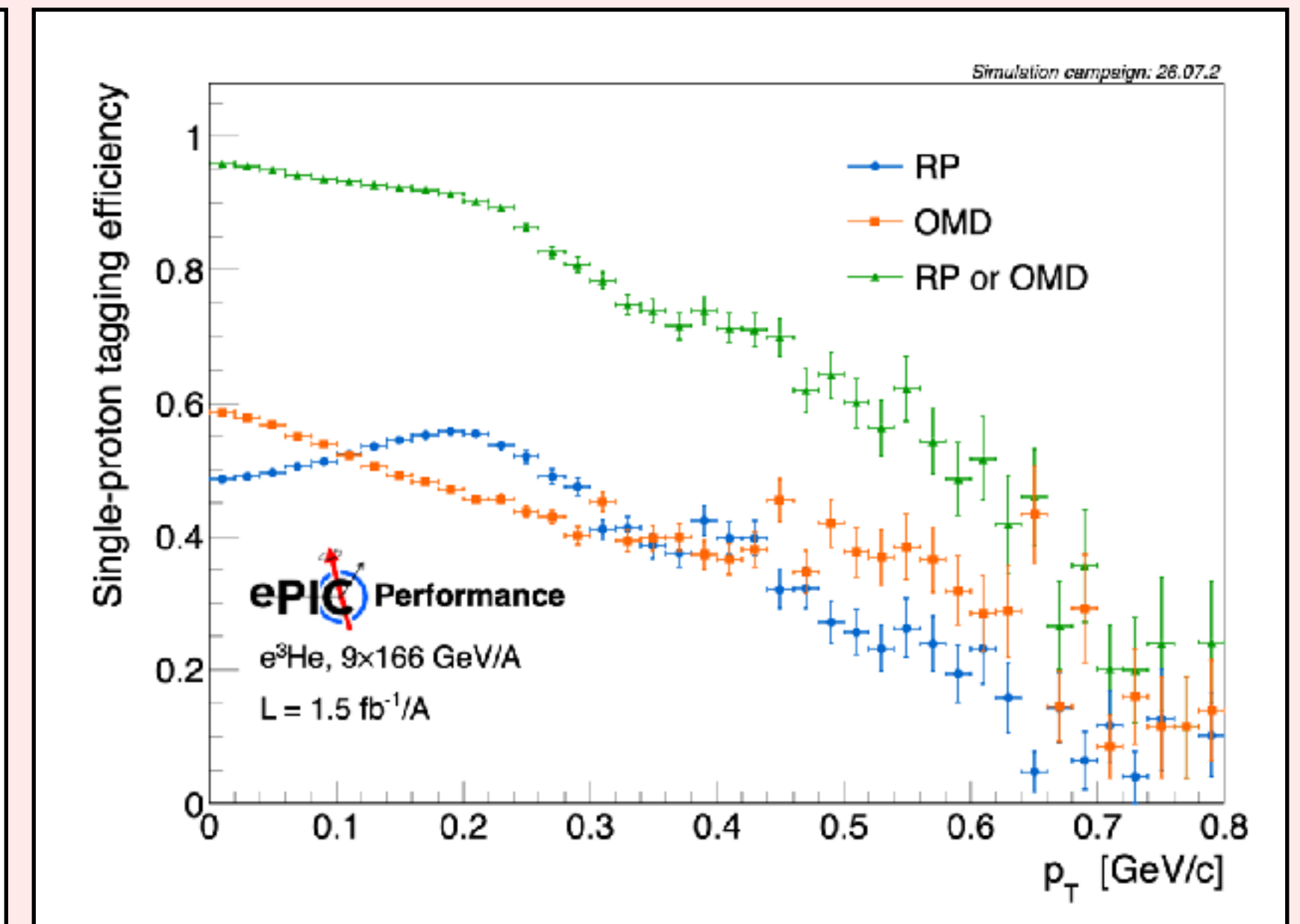
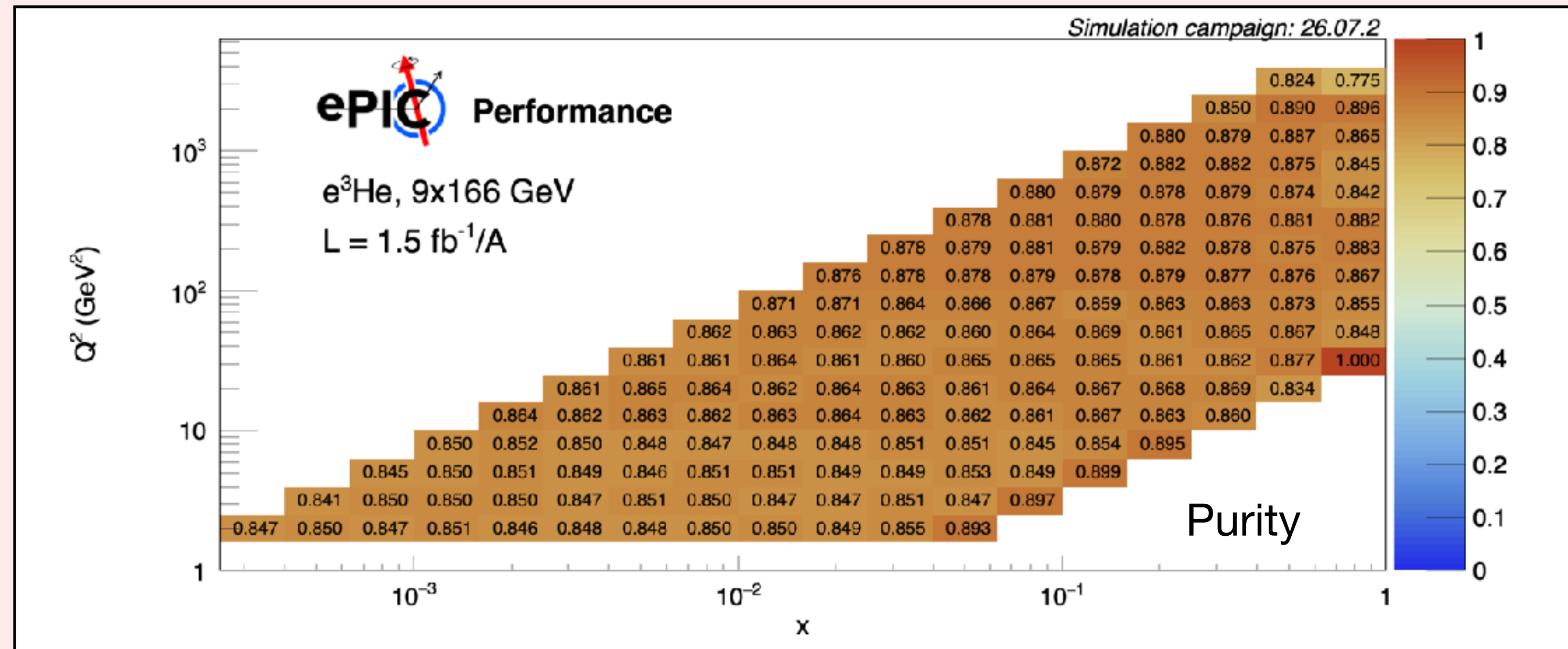
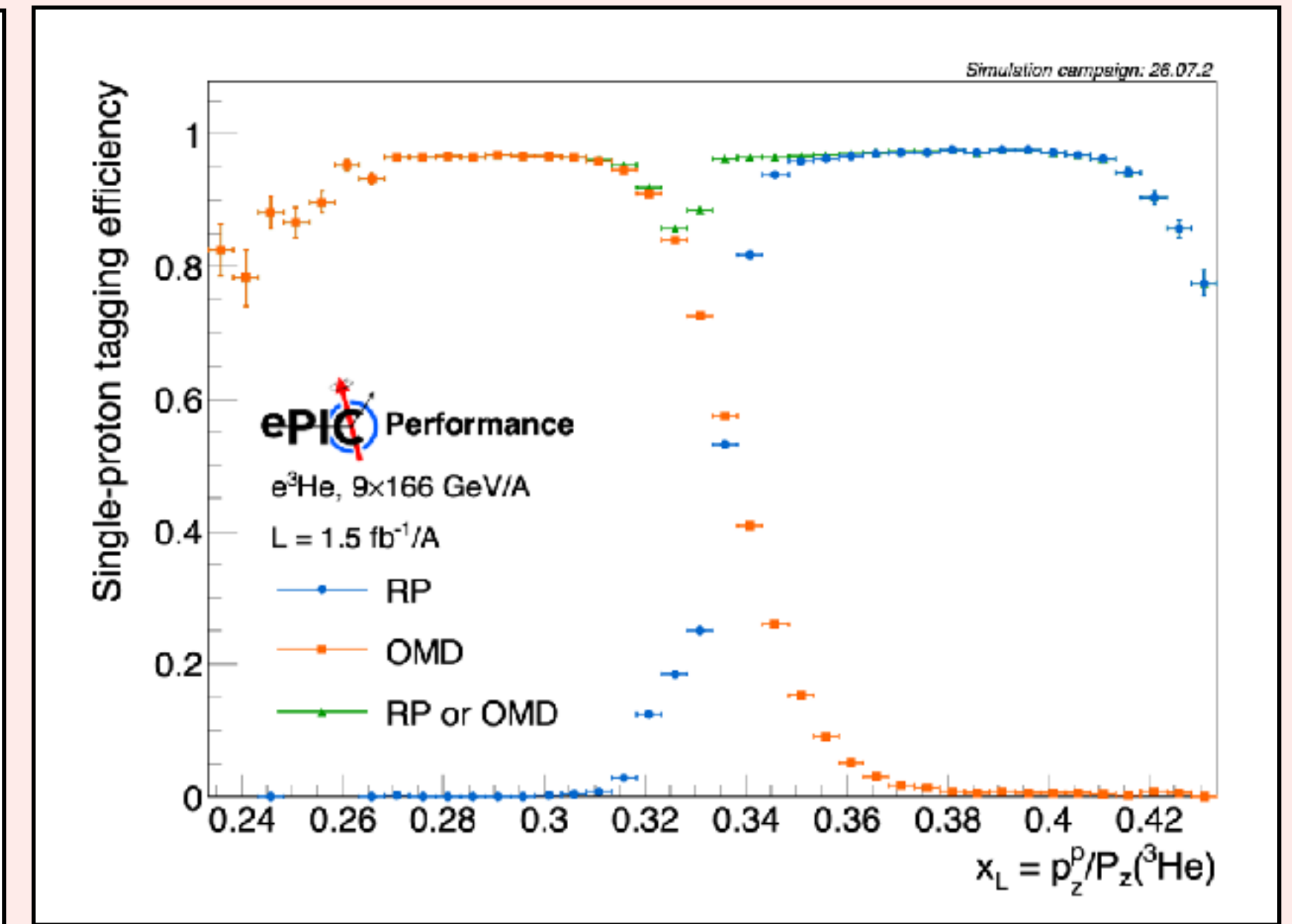
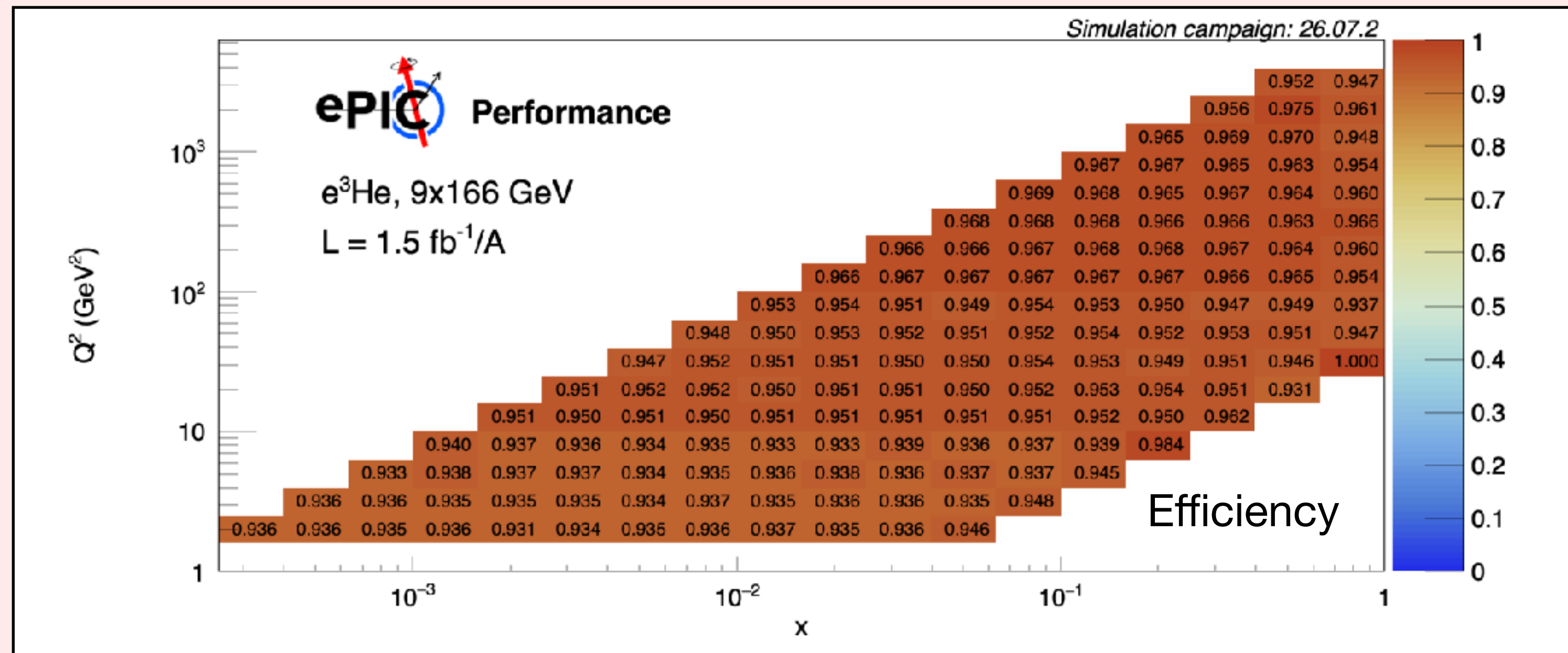
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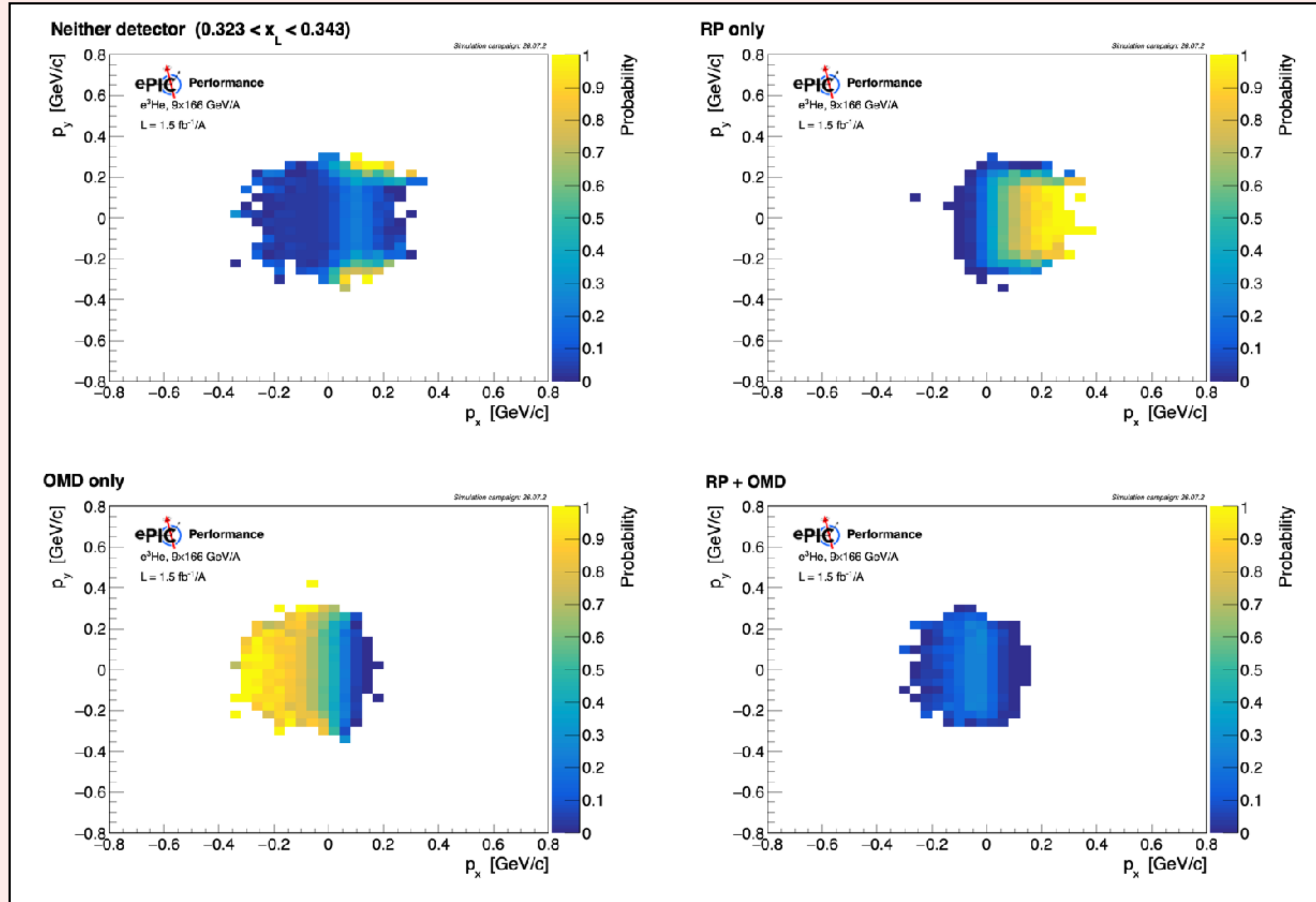
- ▶ eic-smear does not reliably preserve spectator ancestry info
- ▶ “MCParticlesHeadOnFrameNoBeamFX” has spectator info, but only status 1 and 2 particles are propagated in epic simulation
- ▶ BeAGLE does not provide an explicit final state spectator system in almost all ep events
 - ▶ All en events contain both spectator protons as status 1 particles
 - ▶ For most ep events, the spectators remain as status 14 particles
- ▶ Temporary workaround:
 - ▶ Build a detector-response map using clean en events
 - ▶ Apply the map to the spectator proton in ep events
 - ▶ combine prediction with reconstructed proton tracks
- ▶ In future updates, spectator modeling in BeAGLE needs to be revisited



Spectator tagging in case of en scattering

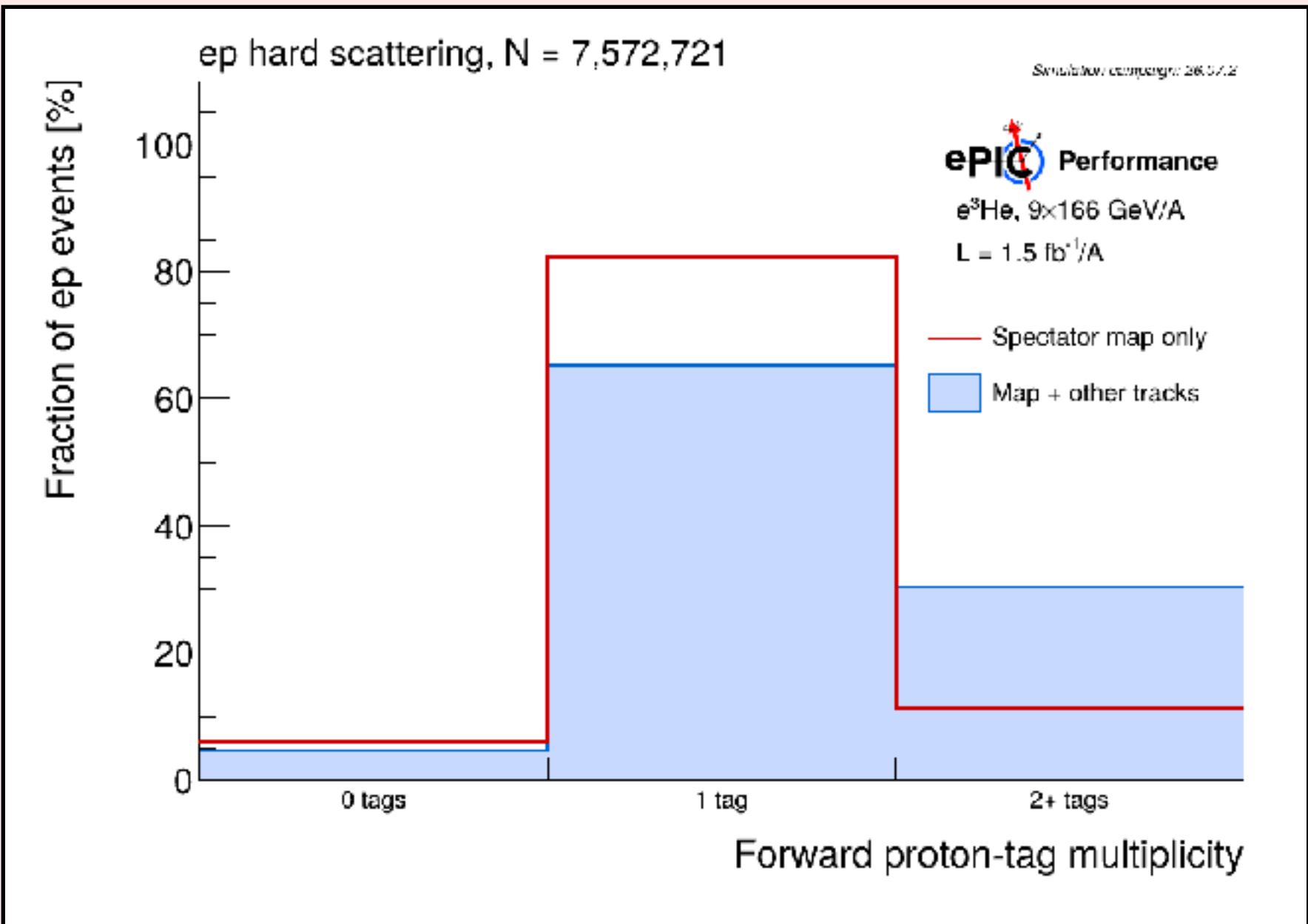
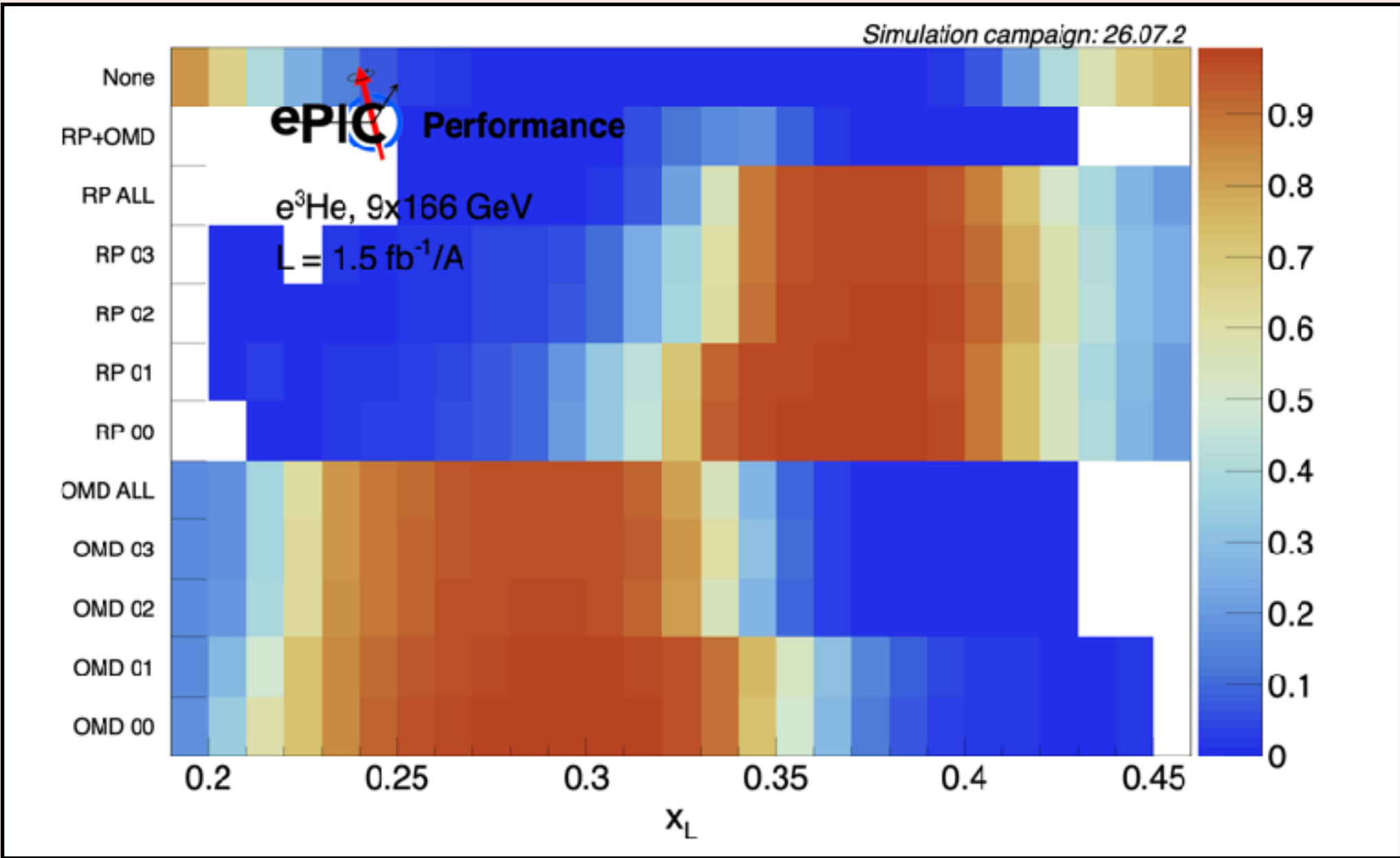
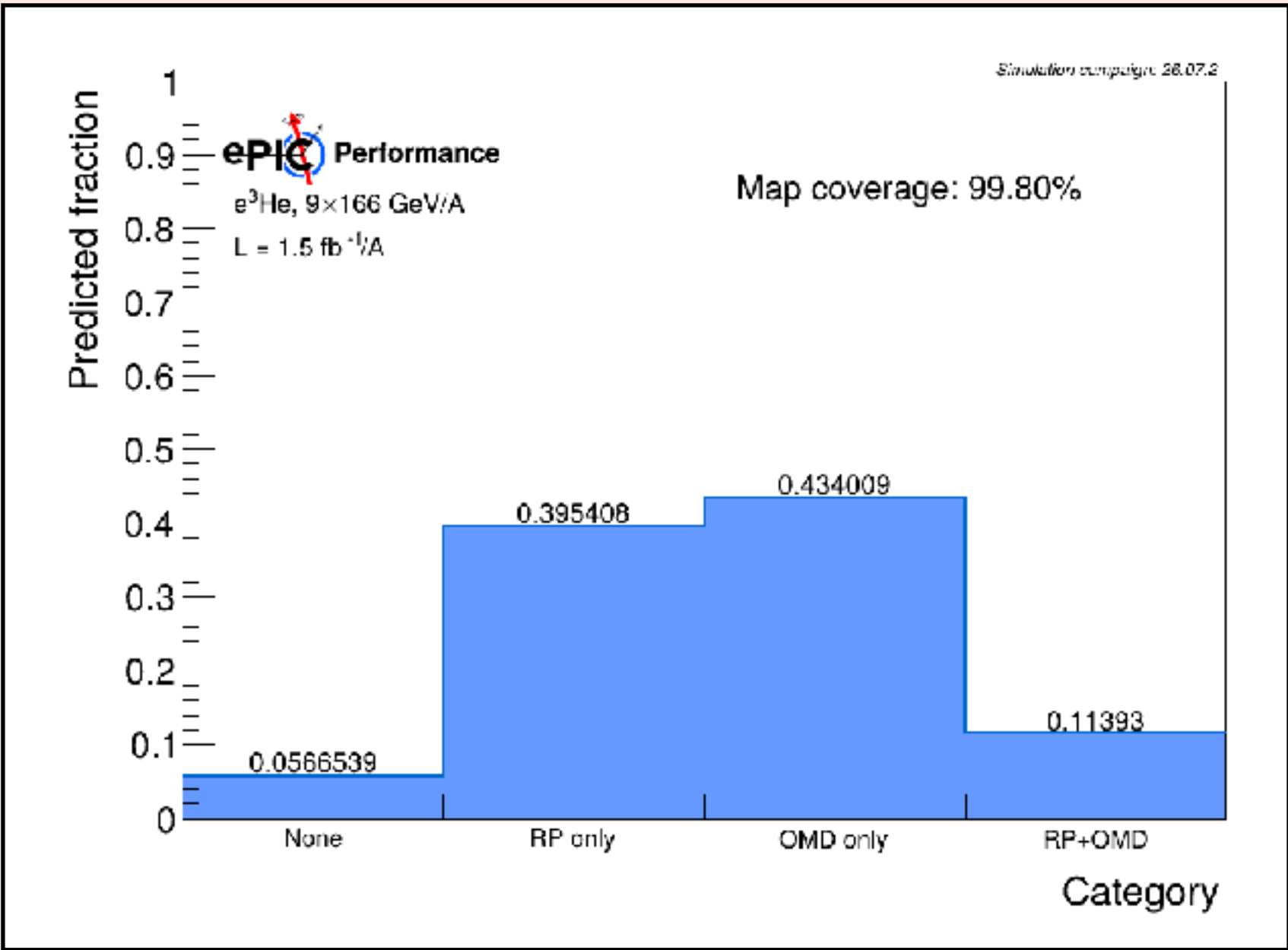
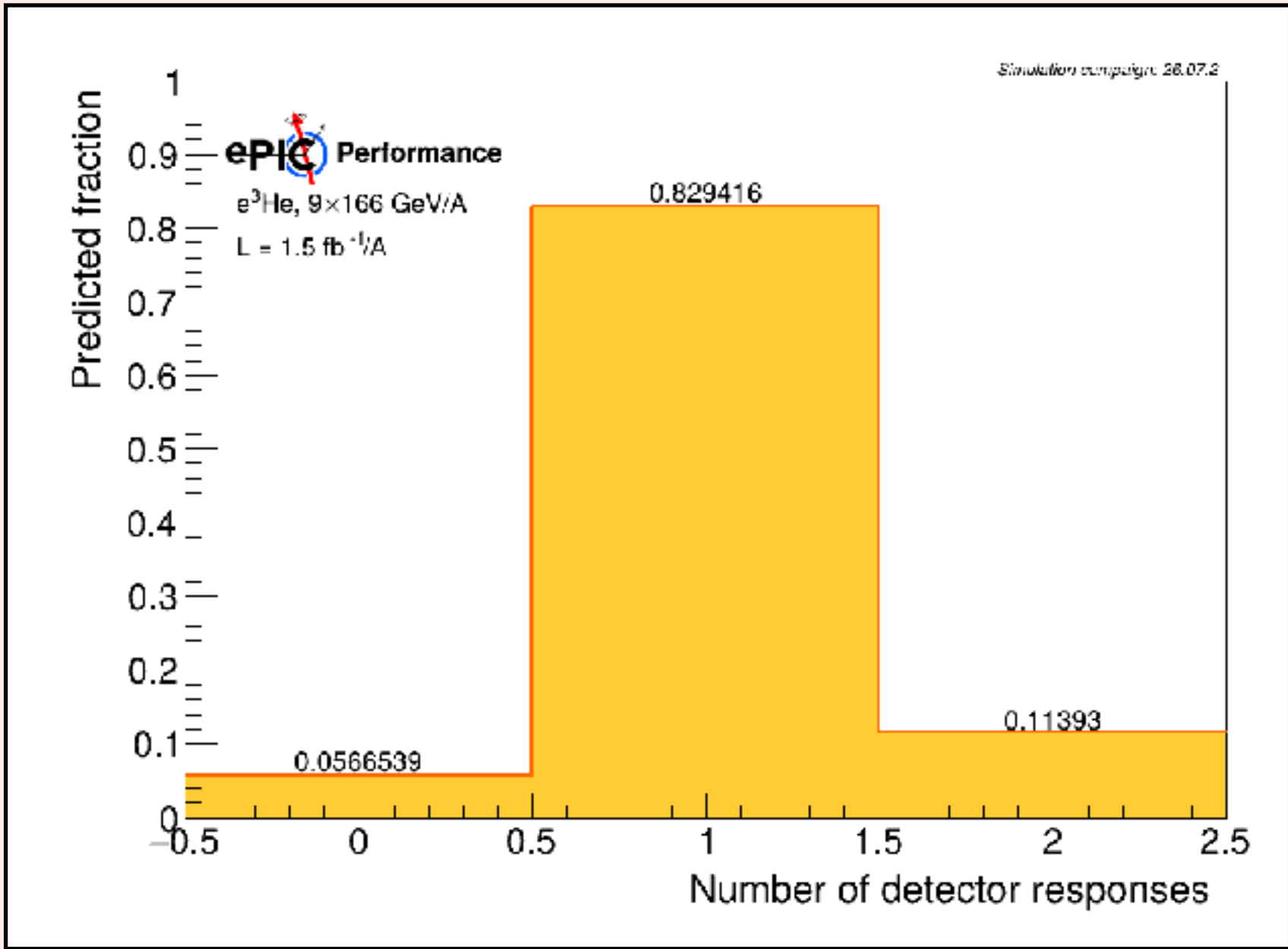
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- ▶ Build a 3D detector-response map (x_L, p_x, p_y) in the headon frame using clean en events with exactly two status-1 protons.
- ▶ For ep events, boost the spectator proton to same frame and use the map to predict its RP/OMD response.
- ▶ Combine that predicted response with the reconstructed proton tracks already present in the event to estimate the total tag multiplicity.

Tagging map



Overall performance

