Coherent VM production paper proposal

15 August 2023

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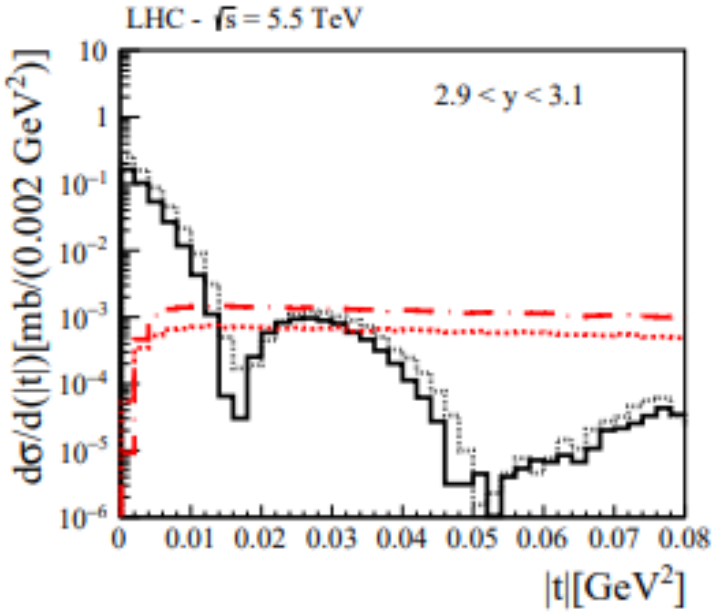
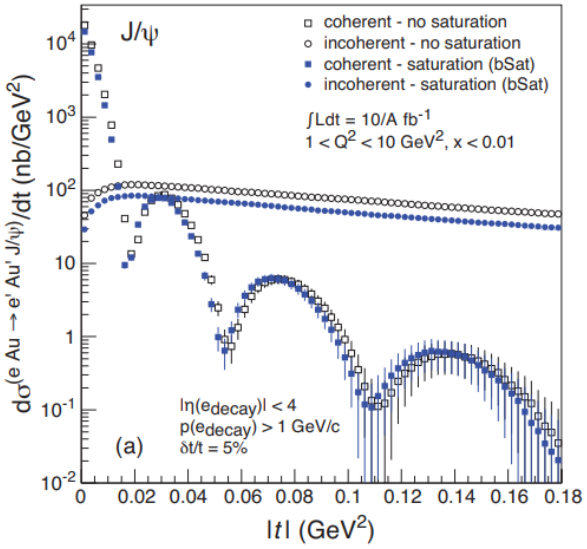
Coherent VM production

Introduction – past studies

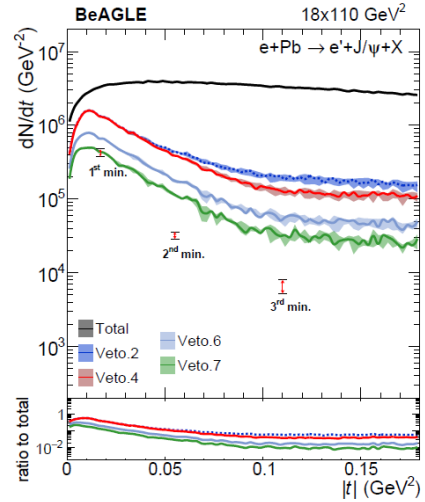
- (In)coherent J/ψ photoproduction in PbPb collisions at the LHC, HE-LHC and FCC (2007.13625)
- Exclusive diffractive processes in electron-ion collisions (1211.3048):
  - Investigation of the background in coherent J/ψ production at the EIC (2108.01694)
  - Challenges in measurements of exclusive J/ψ at the EIC (P. Steinberg@EICUG)

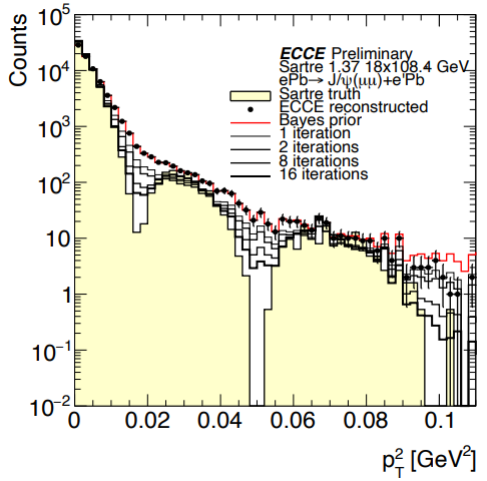




Background rejection

Event reconstruction

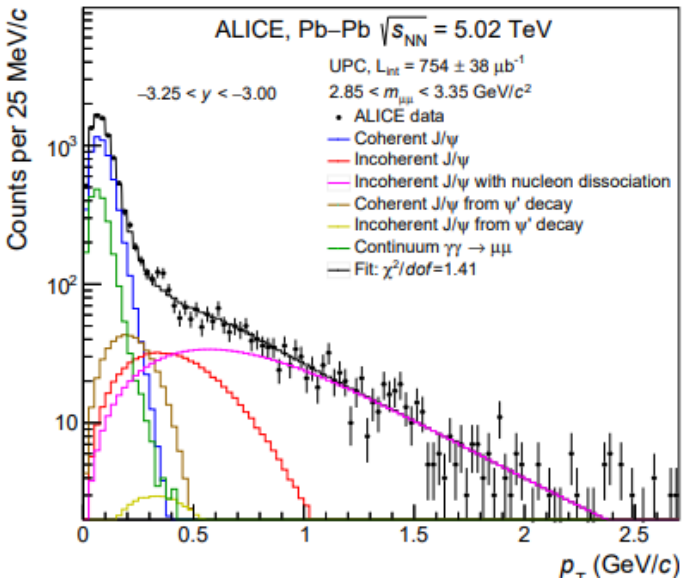


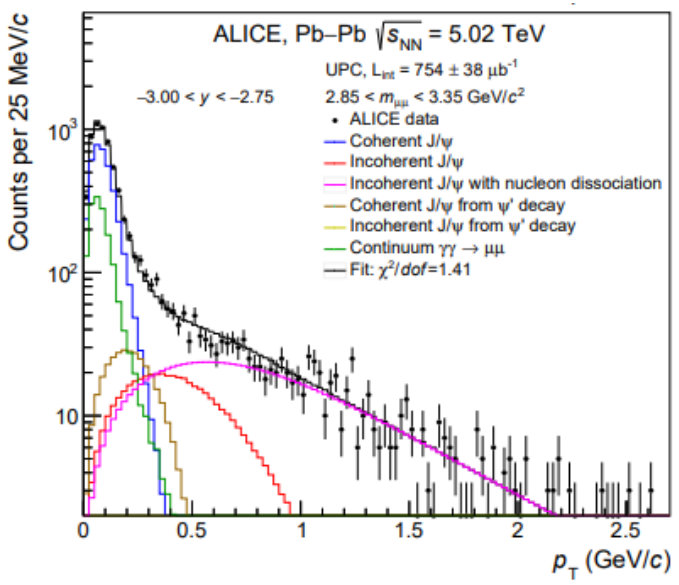


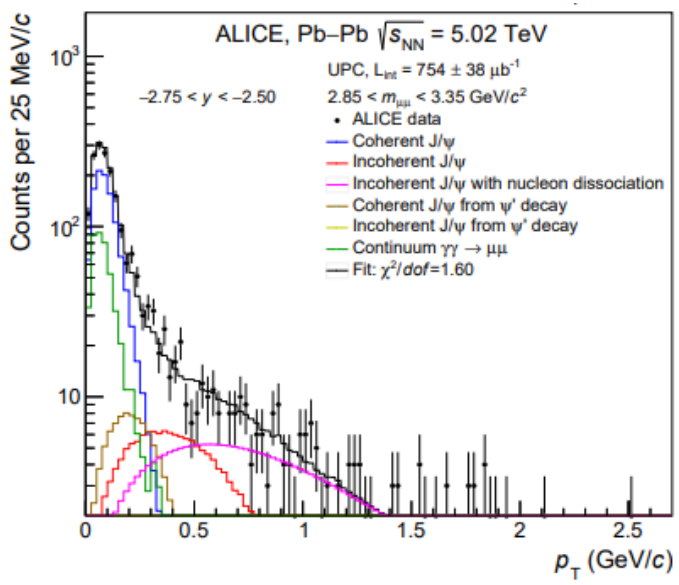
Coherent VM production

Introduction – measurement (example)

"Coherent J/ψ photoproduction at forward rapidity in PbPb UPC" (1904.06272)







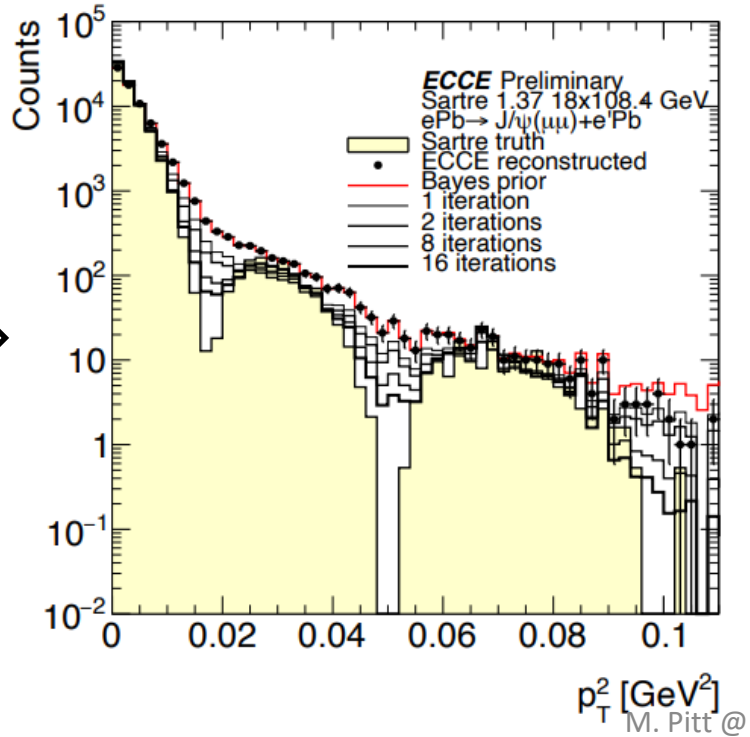
✓ **EIC will be an ideal detector to study coherent production**

Coherent VM production

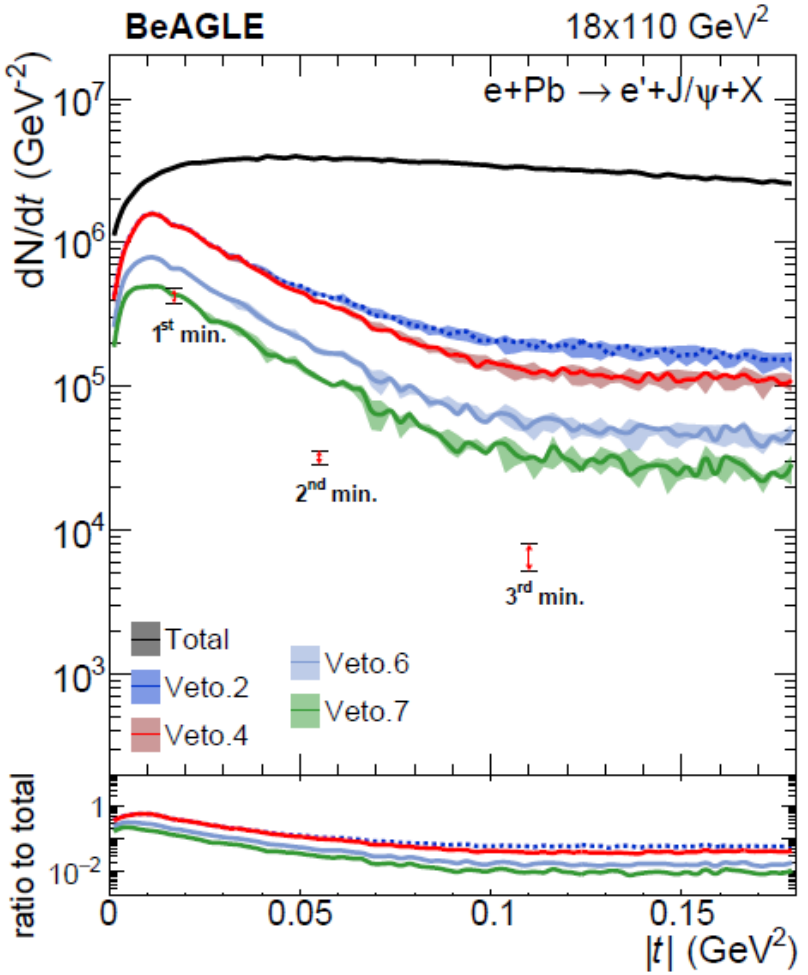
What are the main challenges and what can be improved at the EIC?

- Background in coherent J/ψ production
- Momentum transfer (t) reconstruction

Event reconstruction



Background rejection



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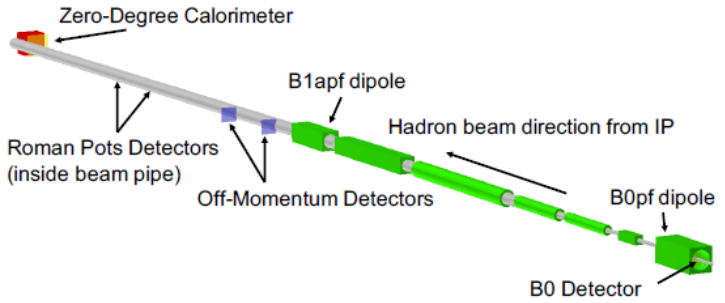

- Veto.1: no activity other than e^- and J/ψ in the main detector ($|\eta| < 4.0$ and $p_T > 100$ MeV/c) ;
- Veto.2: Veto.1 and no neutron in ZDC;
- Veto.3: Veto.2 and no proton in RP;
- Veto.4: Veto.3 and no proton in OMDs;
- Veto.5: Veto.4 and no proton in B0;
- Veto.6: Veto.5 and no photon in B0;
- Veto.7: Veto.6 and no photon with $E > 50$ MeV in ZDC.

Background rejection based on ePIC FFD simulation

- No activity other than e and VM
- Veto signal in B0 (Track/Cluster)
- Veto signal in RP
- Veto signal in OMD
- Veto signal in ZDC

Vetoing signal in detector → tighter cuts on incoherent events

Coherent VM production

What are the main challenges and what can be improved at the EIC?

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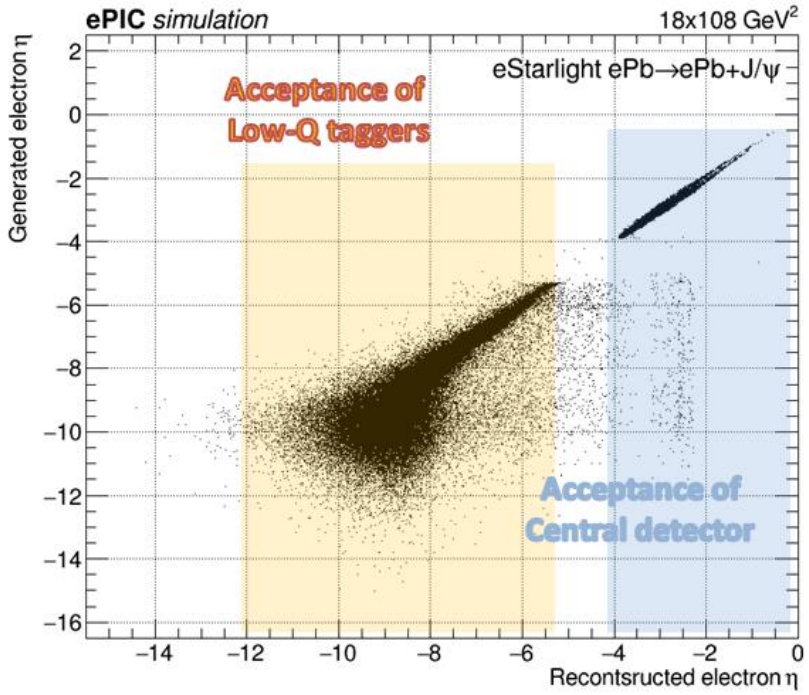
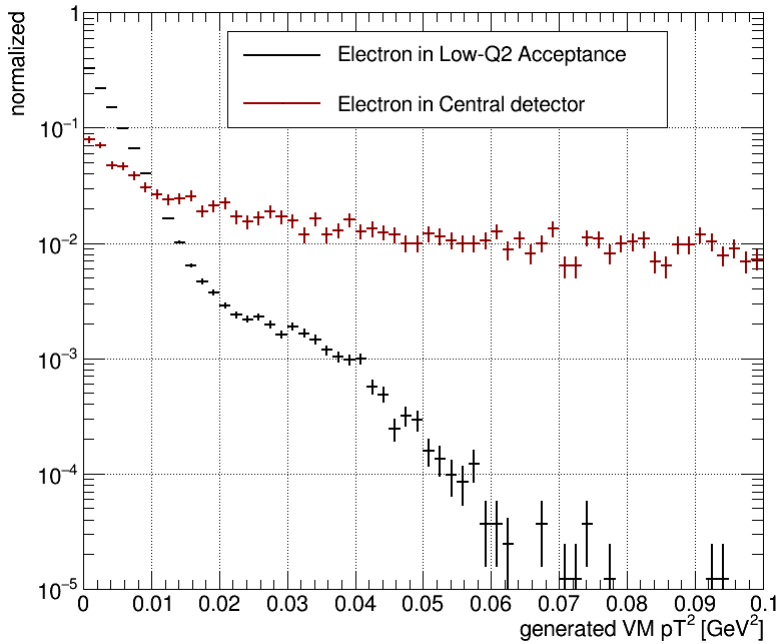
- Adding low-Q2 category
- Increases the signal acceptance by x5

Event reconstruction



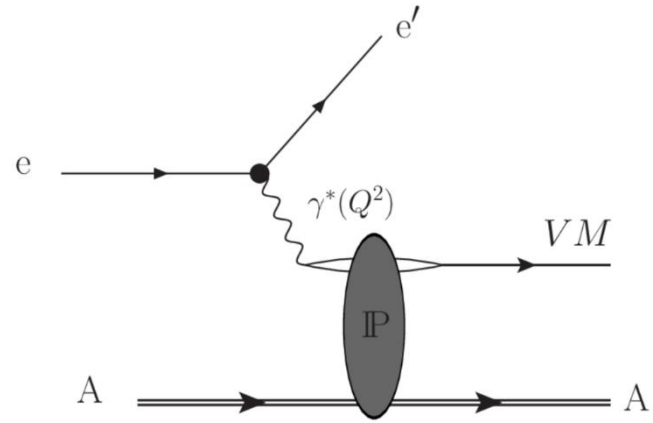


Coherent VM production with ePIC detector

Paper proposal

Authors: The ePIC collaboration? Start with eA study group list

- Introduction and motivation
- MC simulation: eStarlight, BeAGLE
- Object reconstruction (electron + 2 tracks that match VM mass)
- Event selection
  - electron in central detector
  - electron in low-Q2 taggers
- Background suppression
- Reconstruction of t
- Conclusions (how much data needed to measure the dips/peacks)
- Discussion (impact of adding the 0.01<Q2<0.1 region)



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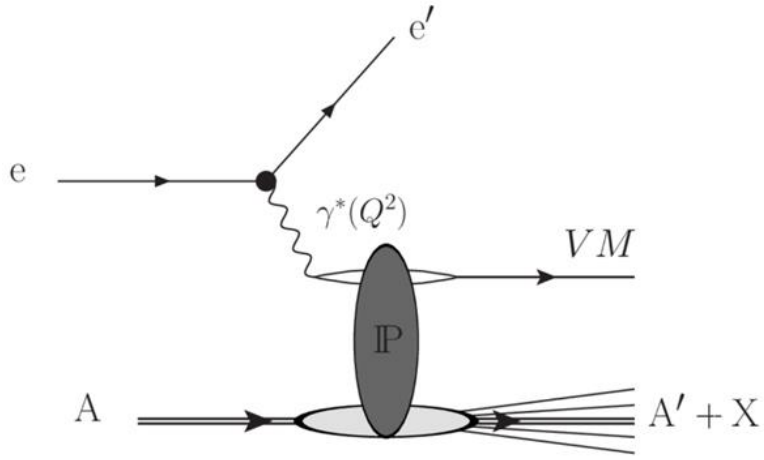

incoherent VM production