# Coherent photoproduction of VM

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## Signal studies:

- Working with eStarlight[1], final state ion fix is still pending: https://github.com/eic/estarlight/pull/23
- Simulation of outgoing ion takes 5min/ev – for now remove the ion from the list of final state particles (at the afterburner step)
- Use the EICRecon output to study the signal acceptance

## Samples:

Signal: generated with eStarlight

/gpfs/mnt/gpfs02/eic/mpitt/public/Simulation/eStarLight/ePb18x108_443013_Q2_0p0_10p0

Background: produced from filtered BeAGLE samples provided by Mark Baker

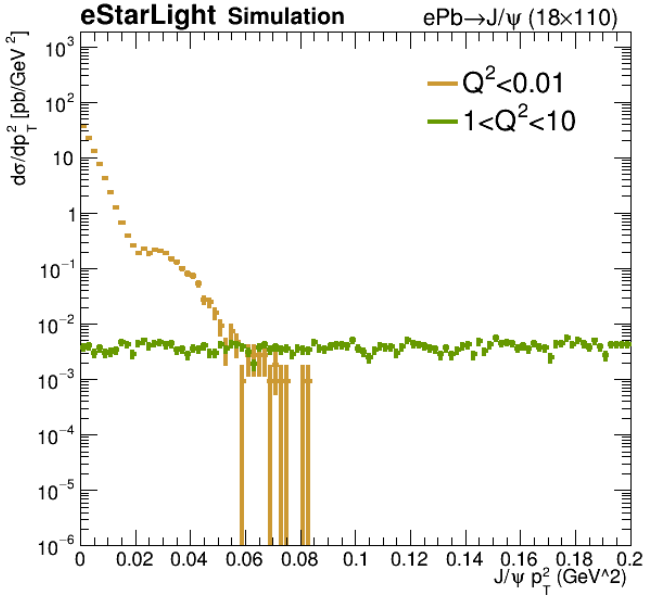
/gpfs/mnt/gpfs02/eic/mpitt/public/Simulation/BeAGLE/ePb_18x108.41_tau10_B1.1_Jpsi_highstats

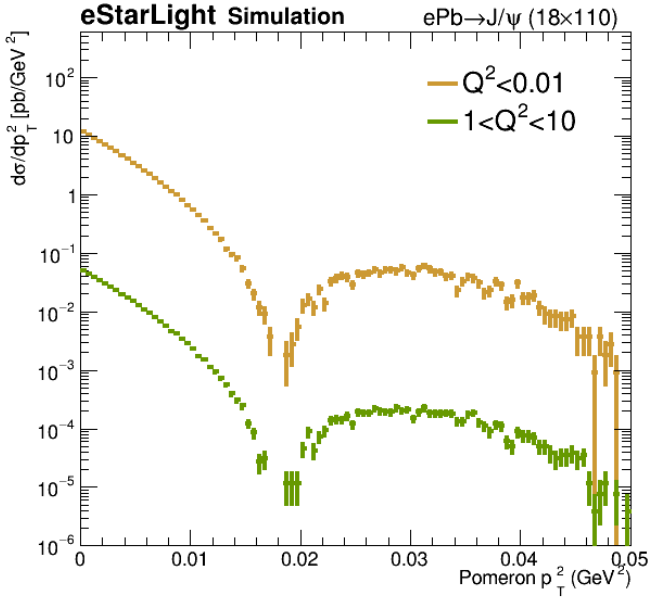
[1] https://github.com/eic/estarlight

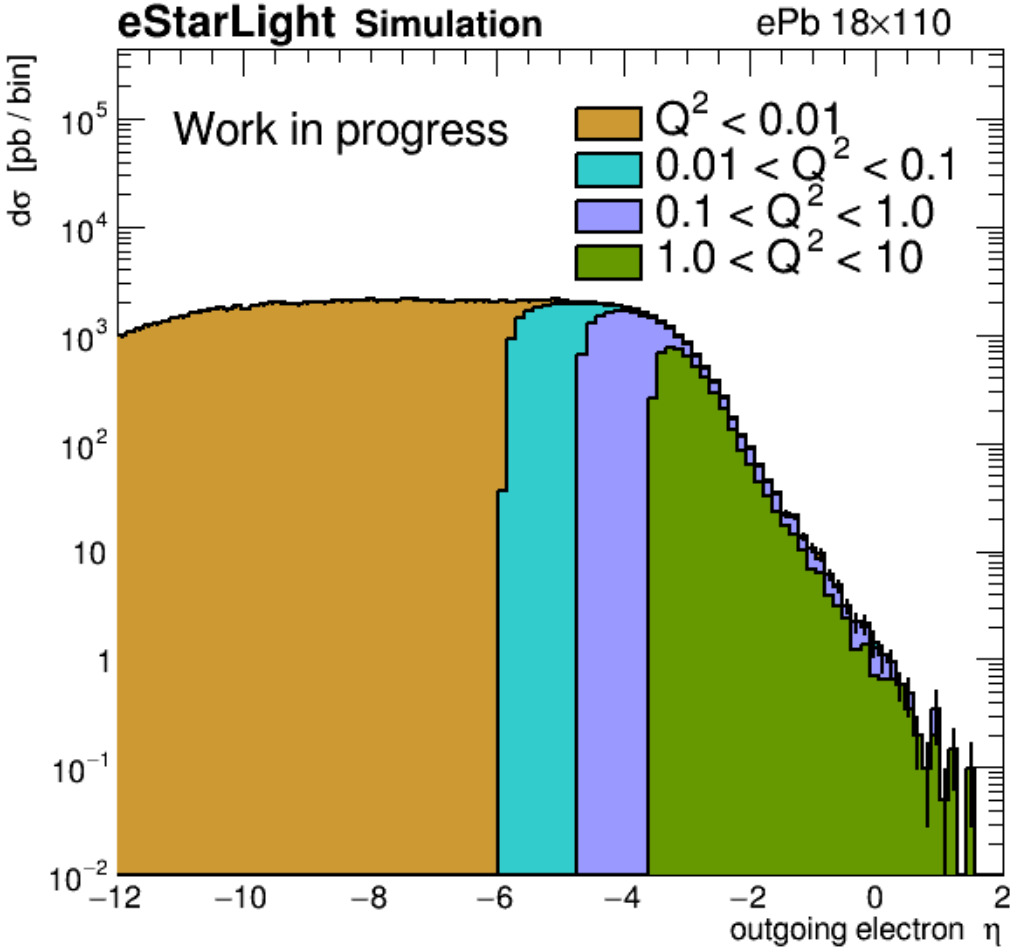
# Reminder

## Q2 dependence:

- Q2 is correlated with outgoing electron eta.
- Proposal to access the low Q region where VM pT is correlated with pomeron pT



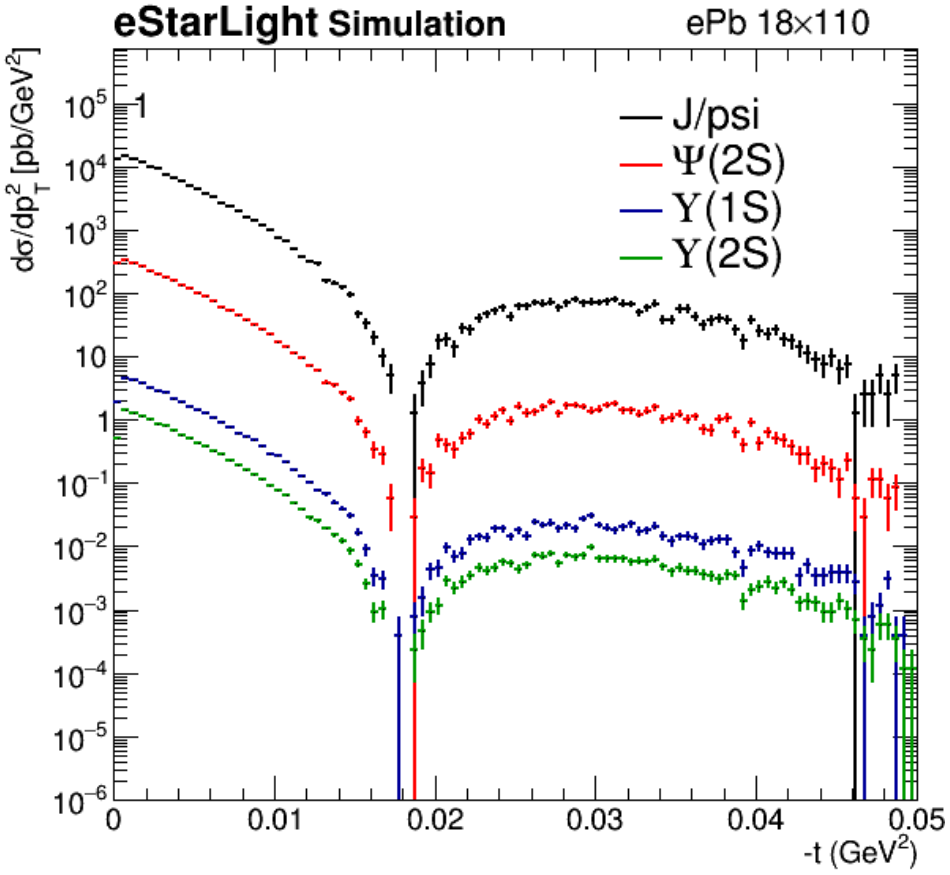



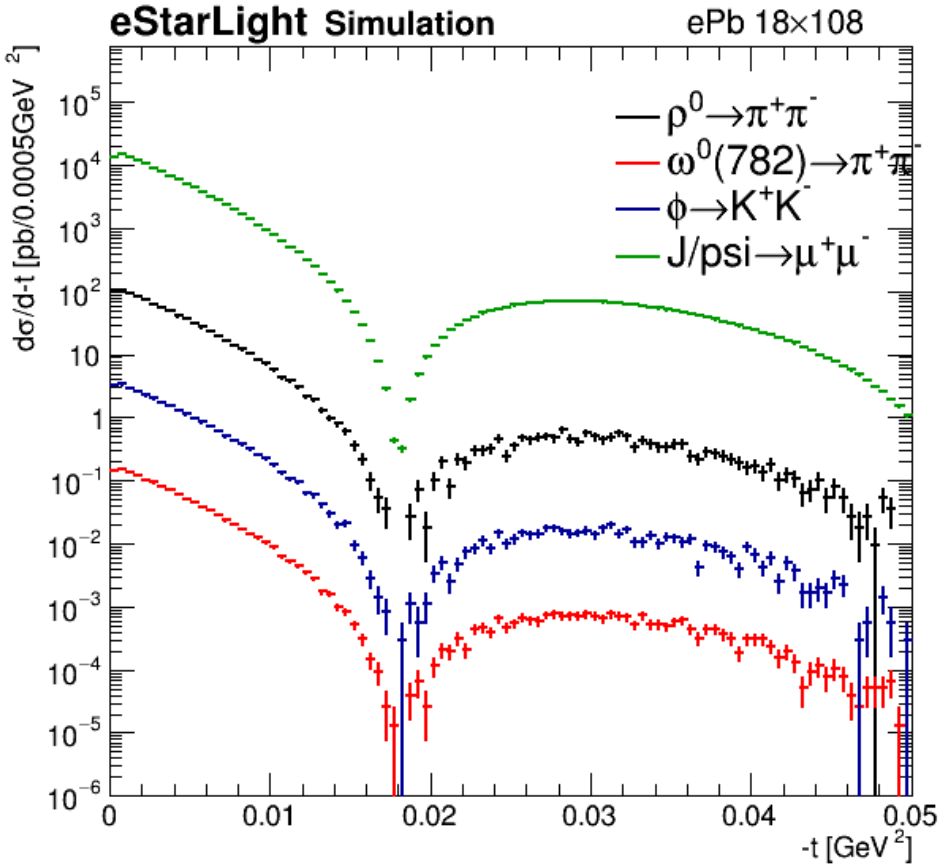



# Coherent VM production at EIC

## Different final states

- All VM processes show the same t spectra, J/psi has the highest cross-section.



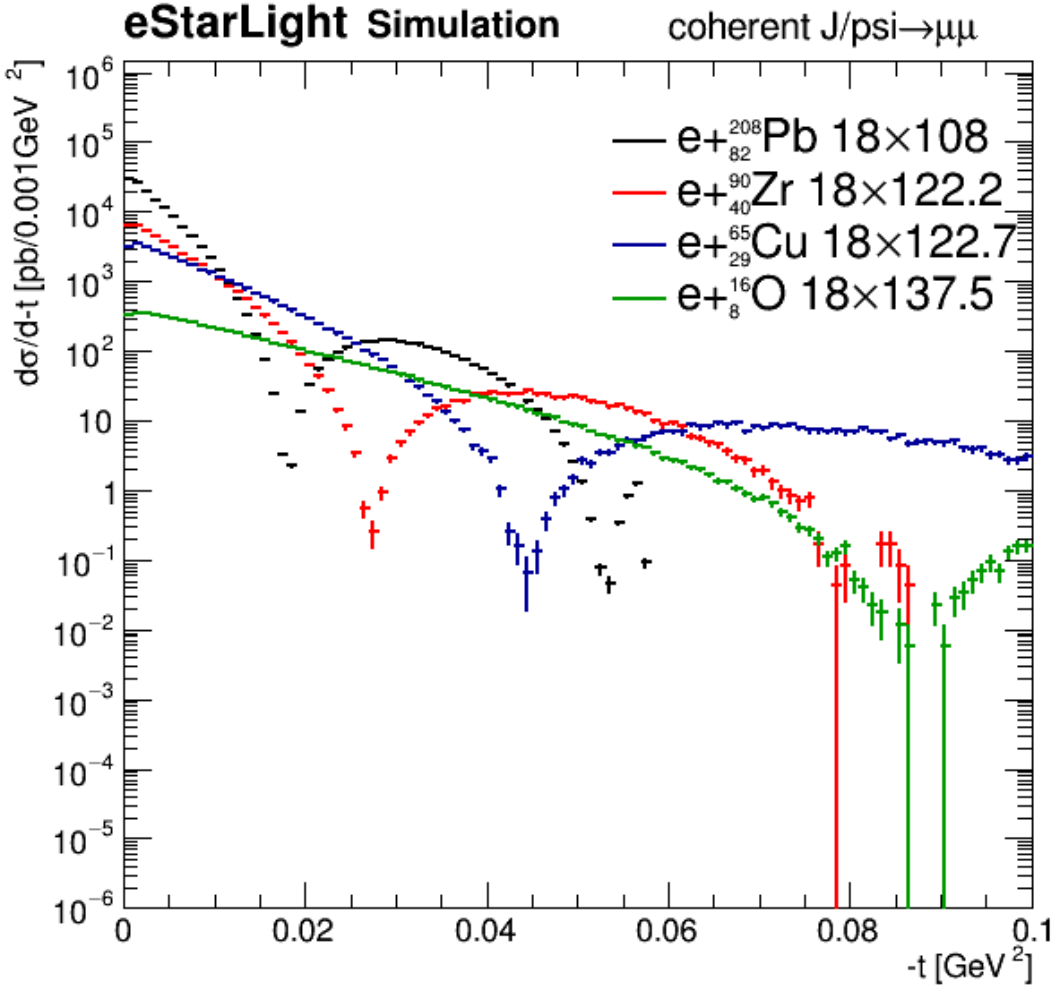

| Decay | BR |
|---|---|
| $\rho^0 \to \pi^+\pi^-$ | 99.9% |
| $\omega^0 \to \pi^+\pi^-$ | 1.53% |
| $\phi \to K^+K^-$ | 50% |
| $J/\psi \to \mu^+\mu^-$ | 6% |

# Coherent VM production at EIC

## Different target particles

- A dependence - high A is preferable (new plot with 1M stat.)

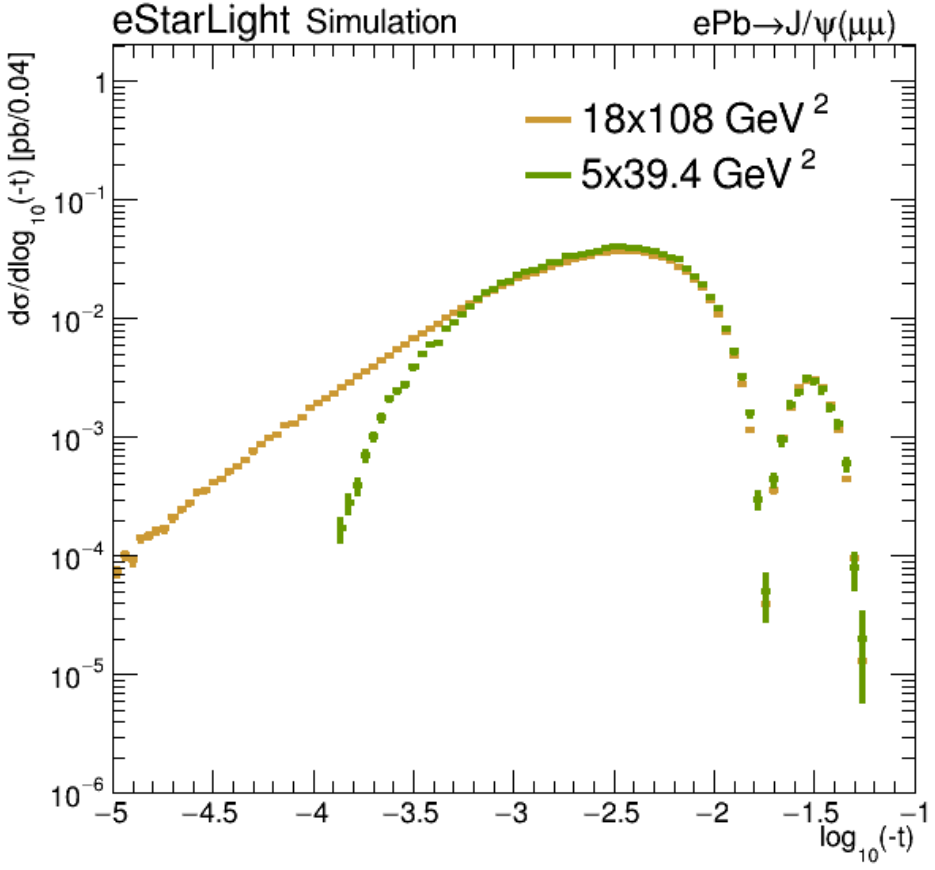
  - 50M events generated for J/psi, but the events are limited to low t
  - Zr was added to the plot

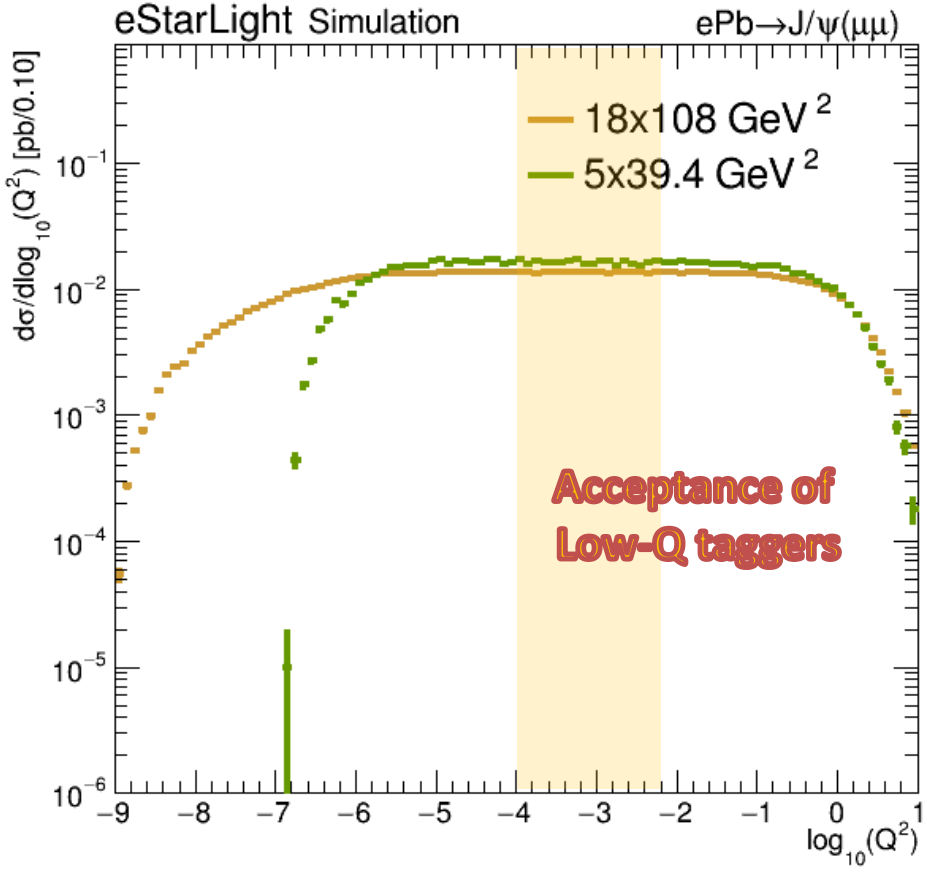


# Coherent VM production at EIC

## Different beam energies

- Beam energy – same cross section at high t, Q
- For low Q2 (t) prefer high energy



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## NEXT

- Production of 10M events with DD4HEP->EICRecon
- Running with nominal energy (18x275) on coherent J/psi->ee and J/psi->mumu
- Backgrounds: incoherent background (for now, switch off the ion simulation to study electron acceptance and mA cut)

**Analysis:**

- Event selection:
  - Tagging low Q sample -> acceptance studies.
  - Two tracks within the J/psi mass window
- Discriminant
  - Meson pT spectra vs t reconstruction (mA constrain)