ECCE Exclusive Reactions Weekly Meeting

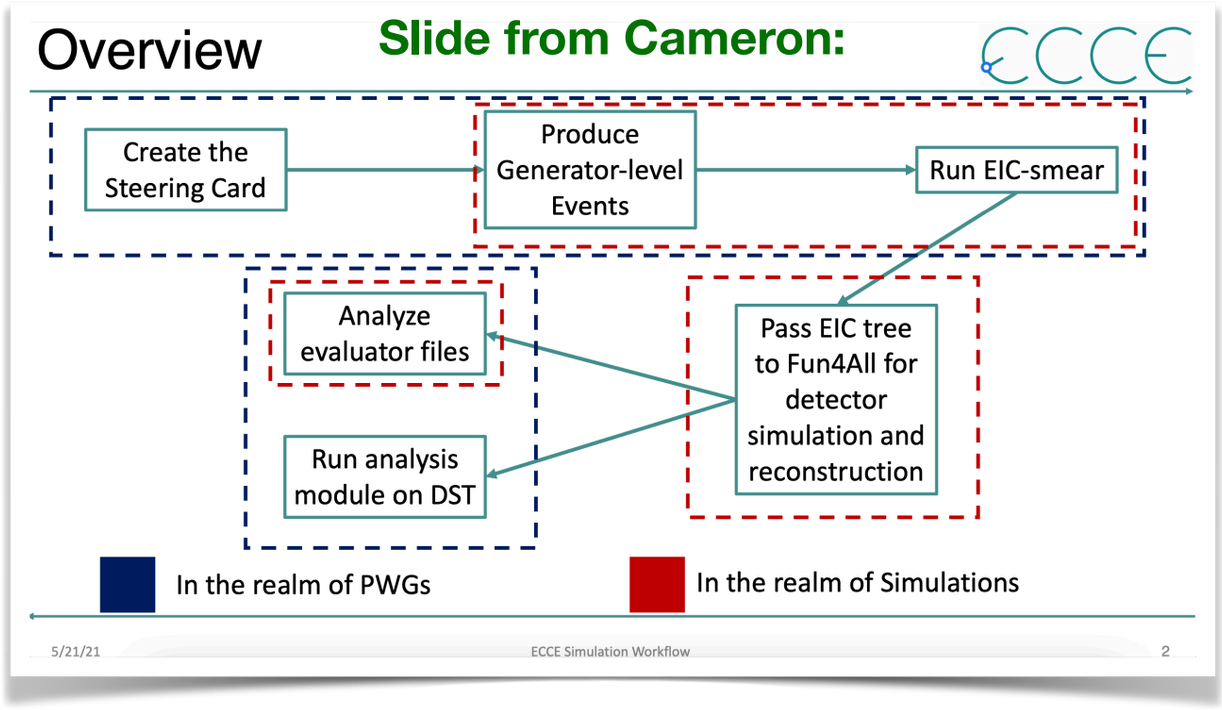
Friday 28th May 2021

J. Roche (rochej@ohio.edu), R. Montgomery (rachel.Montgomery@glasgow.ac.uk)

Second ECCE Simulation Workshop

- Took place last Friday
- Recordings and slides available online:
  - https://indico.bnl.gov/event/11719/
- Guides through simulation workflow including **analysis**

Slide from Cameron:



Mass simulation production supposed to start in a couple of weeks!

Physics Weekly Monday Meeting

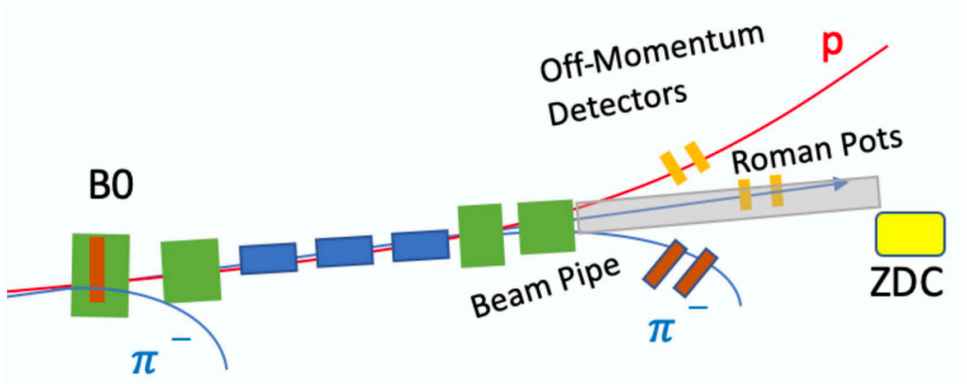
- Tracking update
- Recordings and slides available:
- https://indico.bnl.gov/event/11611/
- If you already know of any tracking requirements for your study let us know

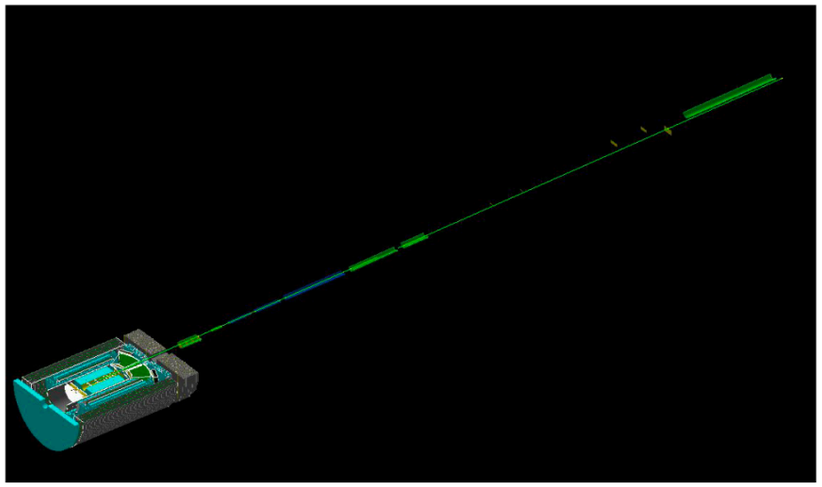
Slide from Axel and Bill:

Update/Status Check on Far-Forward Region IP6

ZDC design priority for end May

- **ZDC**
  - Hit (occupancy) ready
  - no E smear (coming)
  - Position smear (later)
- **Roman Pots**
  - Hit (occupancy) ready
  - No E and position smearing
- **Off Momentum**
  - Not ready
- **B0 Tracking and preshower**
  - Not ready
- **Study will proceed without detector design**
  - **Experts from ECCE and Athena are working together to establish common far-forward design**





2

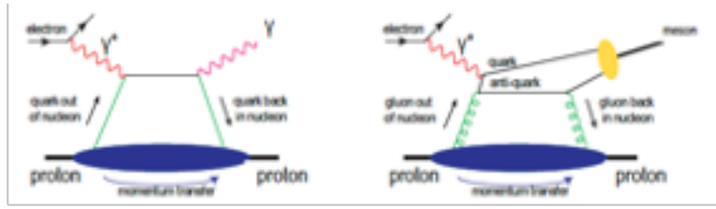
Diffractive meeting page from yesterday:
https://indico.bnl.gov/event/11974/

Exclusive Reactions Physics

- Physics benchmark convenors had discussion last Friday with ECCE steering committee on proposal
- Space for only a few plots in proposal - asked to show example of types of plots we are aiming for
- We should focus on what Exclusive Reaction physics can we cover with ECCE and what makes ECCE unique
- Although space for plots in proposal limited - we should aim for “analysis note” type documents for our studies that we can refer to in proposal

Exclusive reactions - Plots that demonstrate ECCE can do the physics of the Yellow Report

These plots are from the White Paper



γ production (DVCS) from ep

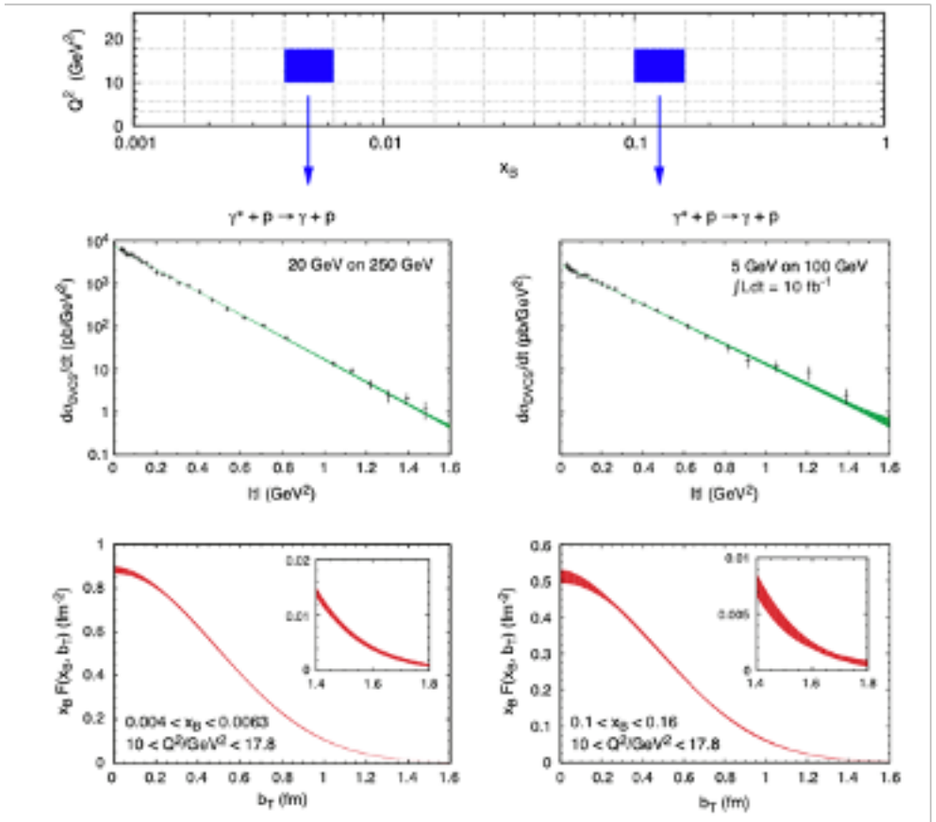


Figure 2.21: Top: The DVCS cross-section in two bins of x and Q^2. The error bars reflect statistical and assumed systematic uncertainties, but not the overall normalization uncertainty from the luminosity measurement. For the left panels the assumed luminosity is $10\,\text{fb}^{-1}$ for $|t| < 1\,\text{GeV}^2$ and $100\,\text{fb}^{-1}$ for $|t| > 1\,\text{GeV}^2$. Bottom: The distribution of partons in impact parameter b_T obtained from the DVCS cross-section. The bands represent the parametric errors in the fit of $d\sigma_{DVCS}/dt$ and the uncertainty from different extrapolations to the regions of unmeasured (very low and very high) t, as specified in Sec. 3.6 of [2].

J/ψ production from ep

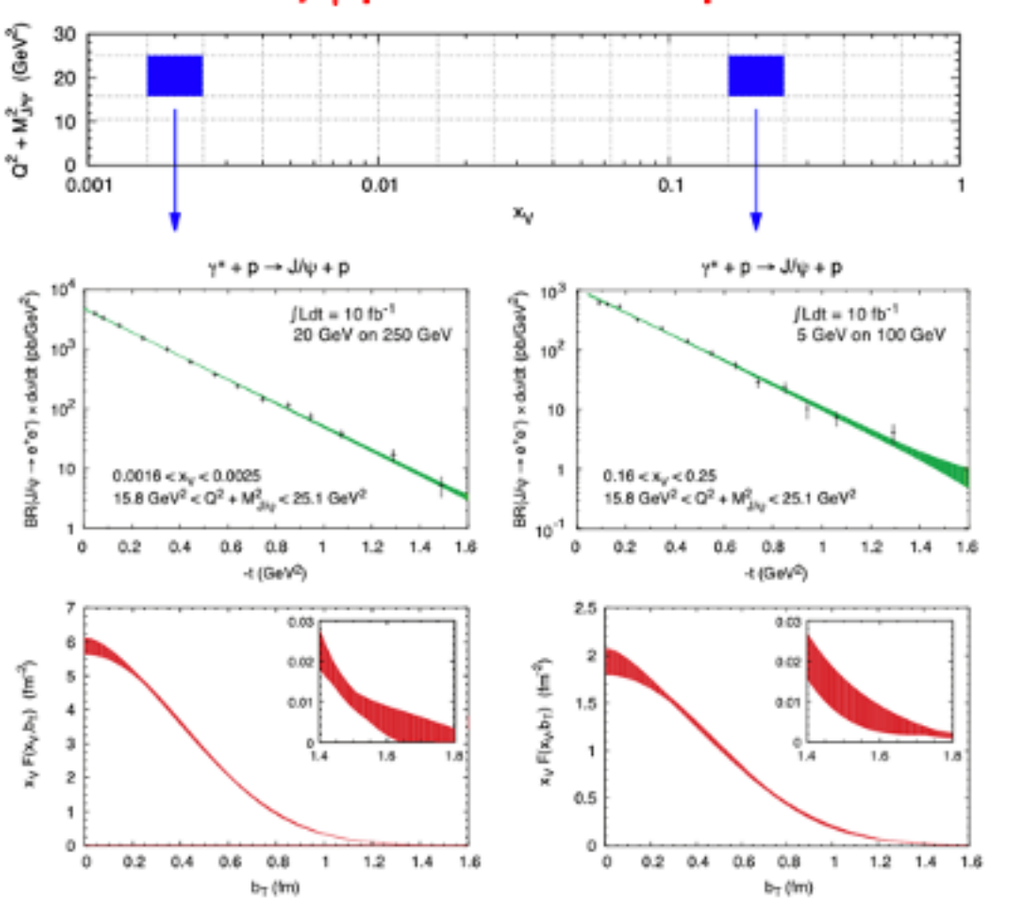


Figure 2.26: Top: cross-section for $\gamma^* p \to J/\Psi p$ in two bins of x_V and Q^2. Bottom: the distribution of gluons in impact parameter b_T obtained from the J/Ψ production cross section. The bands have the same meaning as in Figure 2.21.

Exclusive reactions - Plots that demonstrate a specific ECCE strength or distinctiveness - **1.5 T magnet**

J/ψ production from eA

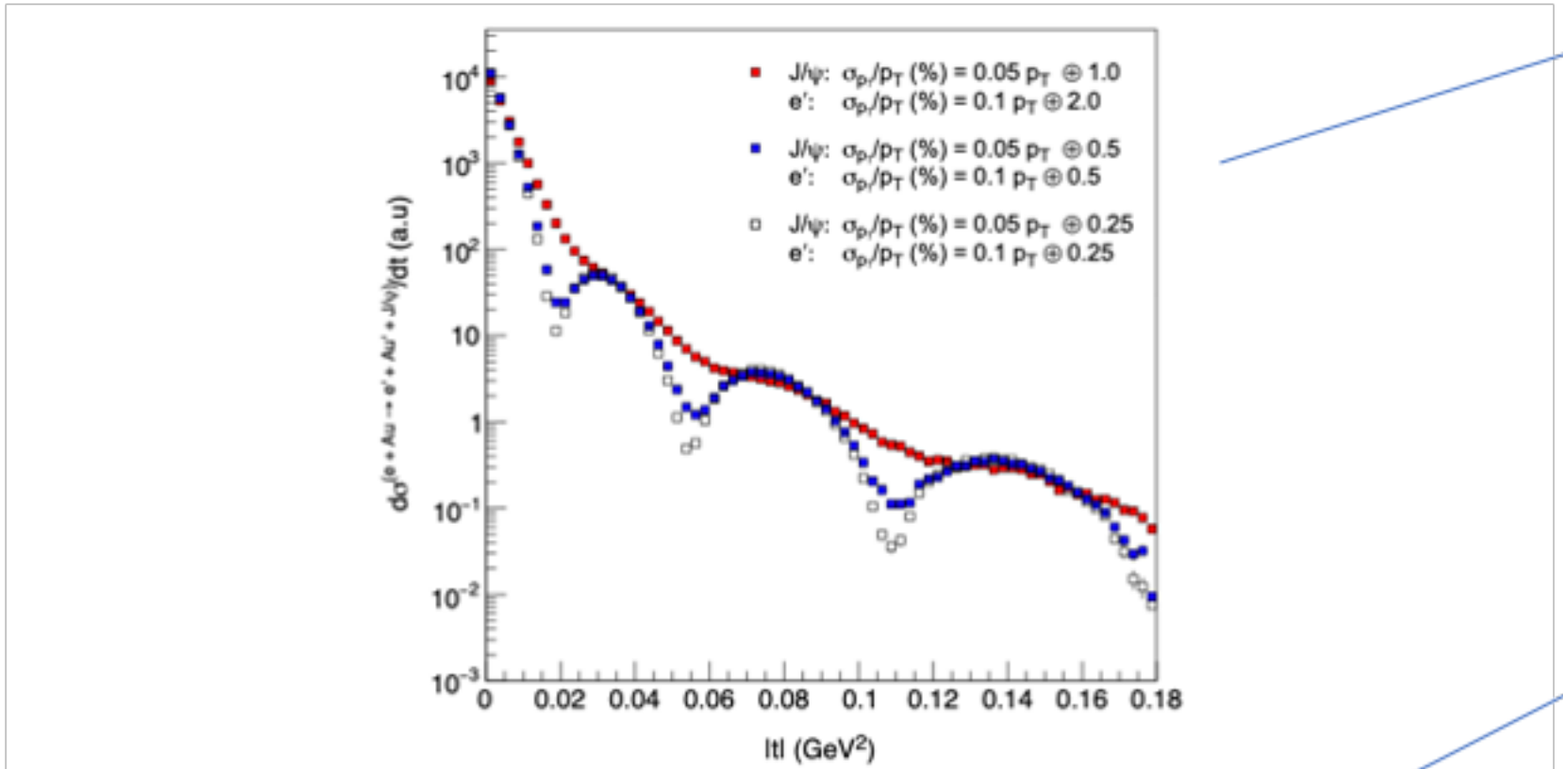


Figure 8.85: Illustration of the impact of different p_T resolutions on the coherent J/ψ production cross section, $d\sigma/dt$, for $1 < Q^2 < 10\ \mathrm{GeV}^2$.

This plot is from the Yellow Report

In discussions with Diffractive group to assign sub-tasks/studies and path forward

What is the ECCE p_T resolution in the forward region?

Being able to suppress the incoherent background is essential for this study to make sense.
Not enough blocking at IP6
Situation unclear at IP8

From a talk presented by M. Baker this week at the Diffractive working group.

Au is out
Pb might be better
Zr might be even better

We will discuss this topic later on today with the diffractive team…

Reminder on Our Current Task List

Tasks

First priority

1. **DVCS and π^0 off the proton**. Check coverage of backward pseudorapidity at η~-3.5 –Igor Korover (MIT).
2. **DVCS off the neutron (ie deuteron with spectactor proton tagging)**. Needs a reasonable design of forward proton and neutron detectors. (Rachel Montgomery, Gary Penman, University of Glasgow)
3. **DVCS of Helium.** Needs to optimize the Roman Pot threshold for recoil nuclei detection. (Rachel Montgomery, Gary Penman, University of Glasgow)
4. **Timelike Compton Scattering (possibly UoG, Orsay, VT at later date June/Jul)**
5. **Exclusive meson production by charged current (e+p -> υ_e π^-p)** → Marat Siddikov, Ivan Schmidt (USM, Chile) Welcome!
6. **Color transparency** – Holly Szumila-Vance
7. **DVMP ρ, ϕ, J/ψ electroproduction and tagged diffractive J/ψ (ep and eA)** in collaboration with Diffractive group – Justin Frantz & Julie Roche, Stuart Fegan, Peter Steinberg (G. Huber, S. Kay meson FF in diffractive).
8. **Diffractive Dijets** (taken over by the Diffractive working group)
9. **u-channel exclusive electroproduction** (taken over by the Diffractive working group)

Today

- Round table for updates
- Discussion about J/Psi or tasks (should do this in second half of meeting)