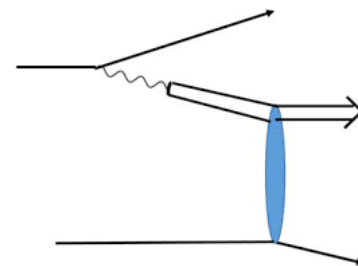


Golden Channels: selection and next steps

Spencer Klein, LBNL

ATHENA exclusive & tagging WG meeting
June 25th, 2021

- **Goals for today**
 - ◆ Choose golden channels
 - ✦ Or find a solid route to convergence
 - ◆ Develop a plan to compare Monte Carlo generators



Golden channels – previous discussion (+)

- Want a mixture of different reactions that challenge different parts of the detector
 - ◆ And weigh in on the preferred magnetic field?
- Many of our channels factorize into ‘central’ & far-forward parts
 - ◆ The latter are mostly from nuclear breakup
 - ◆ Backward/u-channel production is the exception
- Spectroscopy (e. g. XYZ states) is part of our charge
- Far-forward detector design and resolution at low t will be largely similar between the detector proposals, so we should focus on channels which challenge the central detector.
 - ◆ Coherent light ions are mostly limited by far-forward detectors. Should this be a key (partial) channel for the ATHENA proposal?
- Alex Jentsch wants to know if anyone might need good resolution for neutrals (or charged particles) in the B0 detector
 - ◆ I have emailed him privately about backward production

Channels (sans generators)

- DVCS + π^0 + BH (central γ or $\gamma\gamma$ + forward p)
- TCS (central e^+e^-)
 - ◆ more challenging than J/ψ photoproduction channel
- ρ^0 production in ep (central $\pi^+\pi^-$)
- Φ in eA (central K^+K^- + intact/dissociated ion)
- J/ψ in eA (e^+e^- or $\mu^+\mu^-$ + intact/dissociated ion)
 - ◆ For J/ψ show that we can see first (or 2nd or 3rd) minimum
 - ✦ 2nd or 3rd minimum is needed to avoid windowing artifacts in the Fourier transform to $F(b)$
 - ✦ Could do this with other mesons instead (or also)
- Incoherent DVCS on d with double tagging
- Other possible channels
 - ◆ Backward/u-channel production of $\omega \rightarrow \pi^0\gamma$
 - ✦ A challenge for forward calorimetry
 - ◆ Y in eA (e^+e^- or $\mu^+\mu^-$ + intact/dissociated ion)
 - ✦ Need decent mass resolution to separate 3 Y states
 - ◆ $Z_c^+ \rightarrow J/\psi \pi^+$
 - ✦ σ largest at threshold \rightarrow forward focused. Or look at $X \rightarrow J/\psi \pi^+\pi^-$

Generators

- 3 generators with partially/mostly overlapping final states
 - ◆ SARTRE, BEAGLE and eSTARlight
- Do they agree with each other? Do they agree with HERA data?
We should check!
 - ◆ Proposal: pick a set of channels. Have each MC proponent (or ??) generate a set of events (in HEPMC format or ?),
 - ◆ An independent party will compare the cross-sections, & distributions of rapidity, Q^2 , M , t and decay product angles
 - ✦ In multiple Q^2 ranges since the cross-section drops so quickly with Q^2 ?
 - ✦ Other variables to compare (outgoing electron or proton/ion?)
 - ◆ Any volunteers? (I am not independent)
- Possible channels for comparison:
 - ◆ $ep \rightarrow epp + \text{direct } \pi^+\pi^- \rightarrow ep\pi^+\pi^-$ at HERA energies
 - ◆ $ep \rightarrow ep Y(1S) \rightarrow eAuee$ at HERA energies
 - ◆ $eAu \rightarrow eAu Y(1S) \rightarrow eAuee$ 18 GeV e^- on 110 GeV/n Au
 - ◆ $eAu \rightarrow eX \phi \rightarrow eXK^+K^-$ 18 GeV e^- on 110 GeV/n Au

This space for choosing golden channels

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