

Outline	Radiative Correction	Cross Section	Event Generator	Conclusions
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- Introduction
- Different Contributions
- PVDIS case

2 Cross Section

- Models used
- Beam Energy = 4.4 GeV
- Beam Energy = 6.6 GeV
- Beam Energy = 11 GeV

3 Event Generator

4 Conclusions





Polarized lepton-nucleon DIS

$$l(k_1,\xi) + N(p,\eta) \rightarrow l'(k_2) + X$$

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• Born level





Polarized lepton-nucleon DIS

$$l(k_1,\xi) + N(p,\eta) \rightarrow l'(k_2) + X$$

- Born level
- \bullet + lowest order QED corrections



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Contribution from:

- l elastic channel
- II quasi-elastic channel
- III inelastic channel



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Outline	Radiative Correction ○●○	Cross Section	Event Generator	Conclusions
Different	Contributions			

The channel of the reaction is no more specified

Contribution from:

- I elastic channel
- II quasi-elastic channel
- III inelastic channel
- IV virtual photon correction

Radiative Correction

$$\sigma_{RC} = \sigma^{el} + \sigma^{q} + \sigma^{in} + \sigma^{v}$$

Outline
Radiative Correction
Cross Section
Event Generator
Conclusions

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Radiative Correction PVDIS

PVDIS

Studying the parity violating asymmetry

$$A_{PV} = \frac{\sigma_R - \sigma_L}{\sigma_R + \sigma_L}$$

THE FULL ELECTROWEAK INTERACTION IS IMPORTANT

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PVDIS

Studying the parity violating asymmetry

$$A_{PV} = \frac{\sigma_R - \sigma_L}{\sigma_R + \sigma_L}$$

THE FULL ELECTROWEAK INTERACTION IS IMPORTANT

SO....

JUST TO ONE LOOP A LITTLE MORE DIAGRAMS

Radiative Correction 000

Cross Section

Radiative Correction PVDIS

SO....

JUST TO ONE LOOP A LITTLE MORE DIAGRAMS

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Radiative Correction

Cross Section

Event Generato

Conclusions

Radiative Correction PVDIS

At $E = 280 \, GeV$ and $q^2 > 100 \, GeV^2$

90% Radiative Correction to A_{PV} is given by a restricted set





Radiative Correction PVDIS

More information on Radiative Corrections for measurements of Parity violating asymmetries *D.Yu.Bardin, O.M.Fedorenko, N.M.Shumeiko, JINR E2-12761*

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Radiative Correction

Cross Section

Event Generato

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Conclusions

Estimates for Radiative Correction

RADIATIVE CORRECTION PVDIS

- How much important will be each single contribution to the Radiative correction
- STRAGGLING FROM THE TARGET MATERIAL

Radiative Correction

Cross Section

Event Generator

Conclusions

Estimates for Radiative Correction

RADIATIVE CORRECTION PVDIS

- How much important will be each single contribution to the Radiative correction
- STRAGGLING FROM THE TARGET MATERIAL

L.W. Mo, Y.S. Tsai, Rev. Mod. Phys. 1969. V.41. P.205

$$\frac{d\sigma}{d\Omega dE}(E_s, E_p, T) =$$

 $= \int_{0}^{T} \frac{dt}{T} \int_{E_{s(min)}(E_{p})}^{E_{s}} dE'_{s} \int_{E_{p}}^{E_{p(max)}(E'_{p})} dE'_{p} I_{e}(E_{s}, E'_{s}, t) \sigma(E_{s}, E'_{s}) I_{e}(E'_{p}, E_{p}, (T-t))$

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Event Generator

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Conclusions

Estimates for Radiative Correction

$$= \int_{0}^{T} \frac{dt}{T} \int_{E_{s(min)}(E_{p})}^{E_{s}} dE'_{s} \int_{E_{p}}^{E_{p(max)}(E'_{p})} dE'_{p} I_{e}(E_{s}, E'_{s}, t) \sigma(E_{s}, E'_{s}) I_{e}(E'_{p}, E_{p}, (T-t))$$

where:

- T length of the target
- E_s (incoming) and E_p (outgoing) electron energy
- $I_e(E_1, E_2, t)$ modified Bethe and Heitler for straggling
- t with and without equivalent radiator

see http://www.jlab.org/ zana/PVDIS/

Radiative Correction

Cross Section

Event Generator

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Conclusions

e- beam at 4.4 GeV : Ratio EL / DIS



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Radiative Correction

Cross Section

Event Generator

Conclusions

e- beam at 4.4 GeV : Ratio Δ / EL



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Radiative Correction

Cross Section

Event Generato

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Conclusions

e- beam at 4.4 GeV : Ratio Δ / DIS



Outline

Cross Section

Event Generator

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Conclusions

e- beam at 6.6 GeV : Ratio EL / DIS



Outline

Cross Section

Event Generator

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Conclusions

e- beam at 6.6 GeV : Ratio Δ / EL



Outline

Cross Section

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Event Generator

Conclusions

e- beam at 6.6 GeV : Ratio Δ / DIS



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Outline

Cross Section

Event Generator

Conclusions

e- beam at 11 GeV : Ratio EL / DIS



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Outline

Cross Section

Event Generato

Conclusions

e- beam at 11 GeV : Ratio Δ / EL



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Cross Section

Event Generato

Conclusions

e- beam at 11 GeV : Ratio Δ / DIS



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Outline	Radiative Correction	Cross Section	Event Generator	Conclusions
Event Ge	nerator			

Generator

• An event generator has been developed and is now in the svn solid repository (tested and working on *ifarml6* (64bit)) https://jlabsvn.jlab.org/svnroot/solid/evgen/

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Generator

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- At now is generating uniformly in x and y
- Implementation with the cross sections under work

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- Estimates for radiative correction contributions to PVDIS have been calculated
- Inelastic cross section need to be added
- More resonances need to be included
- Convolution of this work with full Radiative Correction is in progress

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Event Generator:

- Event generator on svn repository
- Uniform in x and y
- Implementation with different cross sections in progress