Software EIC collaboration: tools & accessibility

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How can you work on EIC at BNL?

1. You require an active BNL Life or Guest Number

   ▶ https://fsd84.bis.bnl.gov/guest/guest.asp

2. Obtain an RACF account

   ▶ https://www.racf.bnl.gov/experiments/rhic/useraccounts

That's it!

Andrew File System (AFS)

- You also get an AFS account and working area.

- EIC has its own AFS area

  /afs/rhic.bnl.gov/eic/

- This contains directories

  - DATA/ **- for storing large files**

  - PACKAGES/ **- the EIC code repository**

eRHIC Wiki

https://wiki.bnl.gov/eic/index.php/Main_Page

PYTHIA

- High-energy event generator for e^+-e^-, e-p and p-p collisions.

- Simulates parton distributions, hard processes, initial- and final-state radiation, beam remnants and hadronisation.

- PYTHIA version 6.4 is the latest supporting ep collisions.

- PYTHIA 6.4.13, including optional radiative corrections, is available on the EIC AFS region:

  /afs/rhic.bnl.gov/eic/PACKAGES/PYTHIA-RAD-CORR

PYTHIA

- See Peter Schnatz's talk
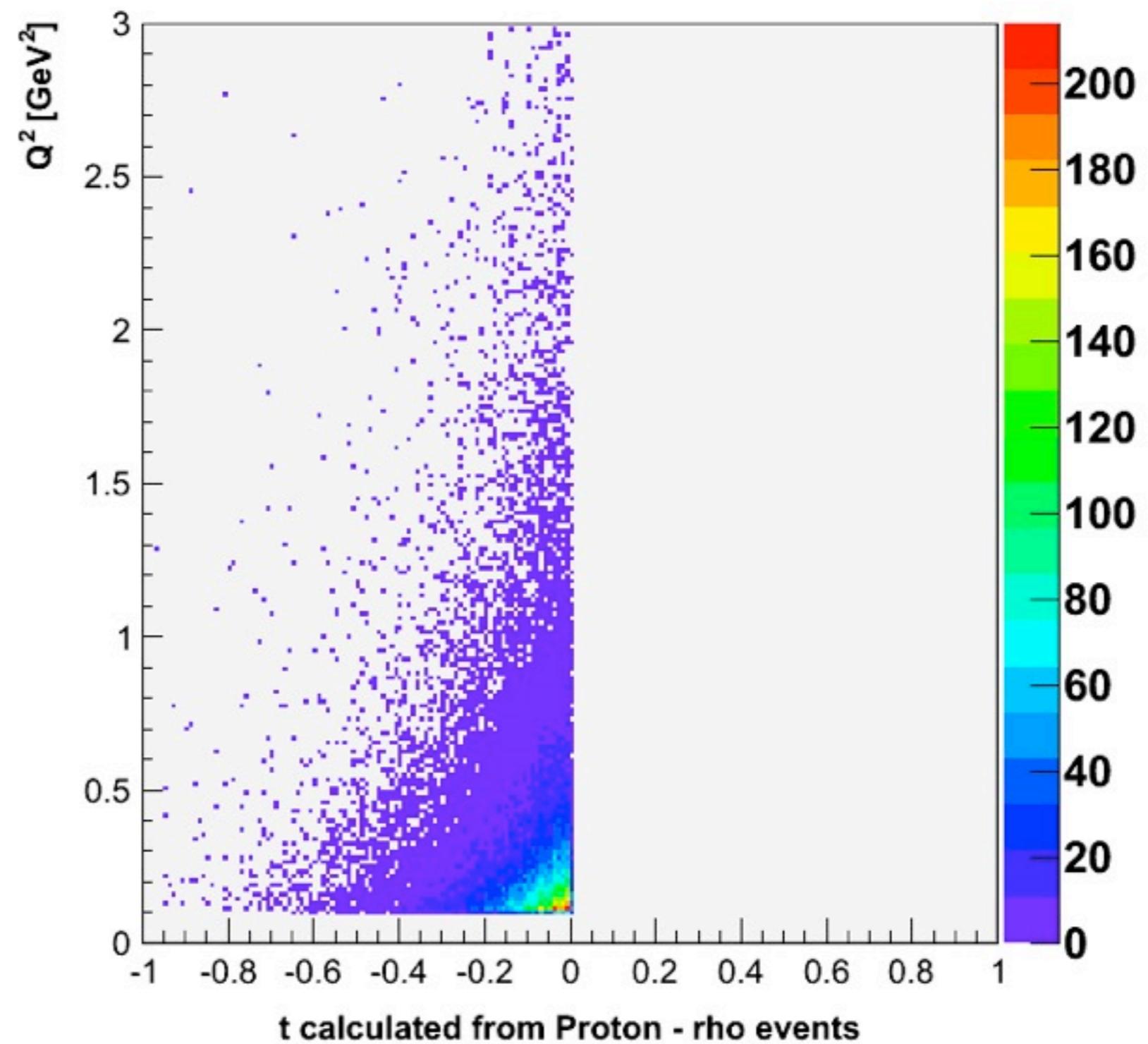
RAPGAP

- Monte Carlo for DIS, including diffractive scattering ("rapdity gap") events.

- Contains a number of models for diffractive scattering, including support for user-defined models.

- Supports QED radiative corrections, simulated with HERACLES.

- RAPGAP 3.1 is available on the EIC AFS region:

  /afs/rhic.bnl.gov/eic/PACKAGES/RAPGAP/rapgap31

# RAPGAP

- See William Foreman's talk.
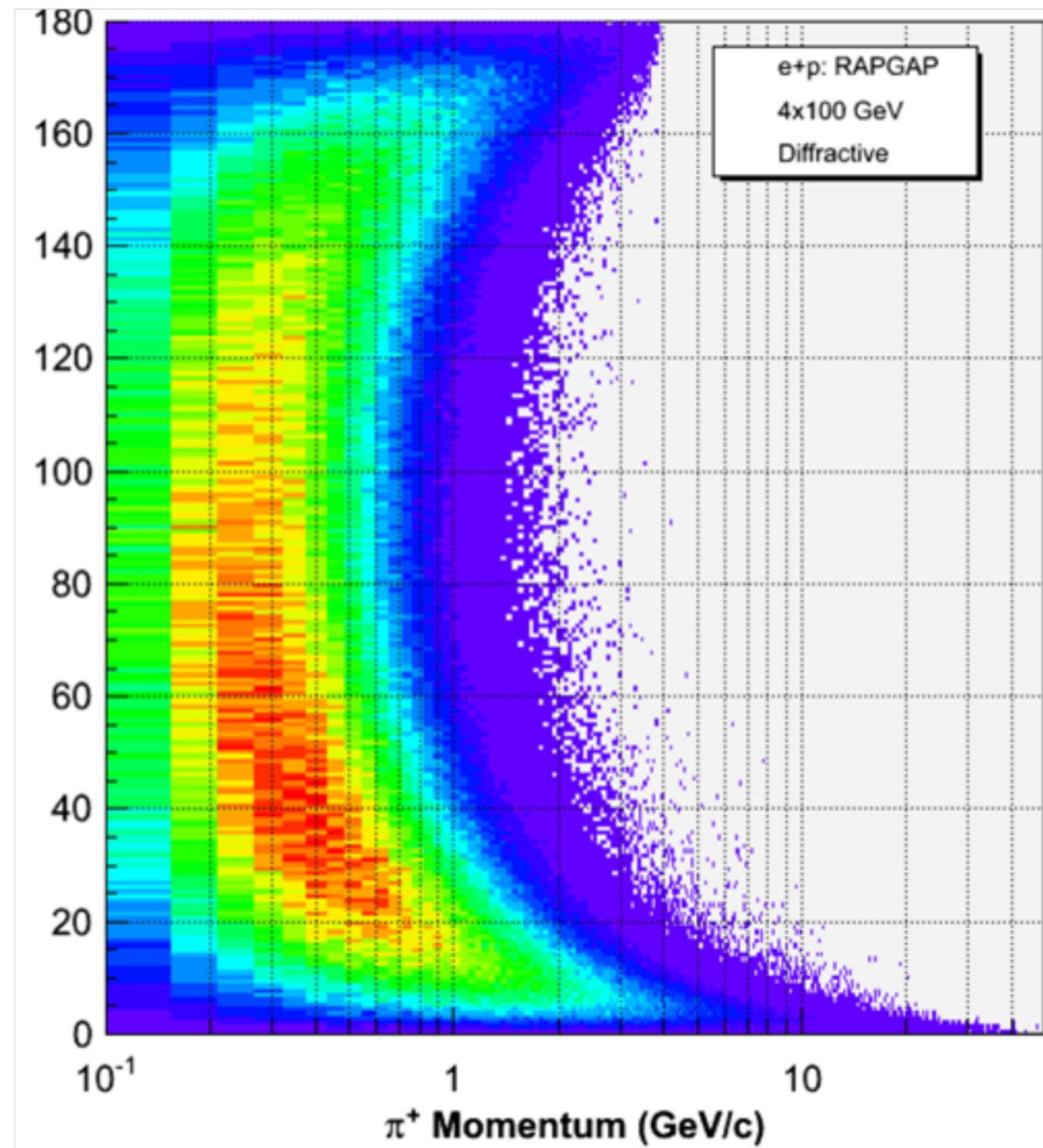
PEPSI

- **P**olarised **E**lectron **P**roton **S**cattering **I**nteraction.

- Monte Carlo for polarised deep inelastic leptoproduction via EM interaction based on LEPTO.

- Generates hard γ^*-parton scattering according to polarisation-dependent cross section.

- Has inbuilt $\Delta q(x)$ and $\Delta g(x)$ distributions and supports user-implemented distributions.

- PEPSI is available on the EIC AFS region:

 /afs/rhic.bnl.gov/eic/PACKAGES/PEPSI/

PEPSI
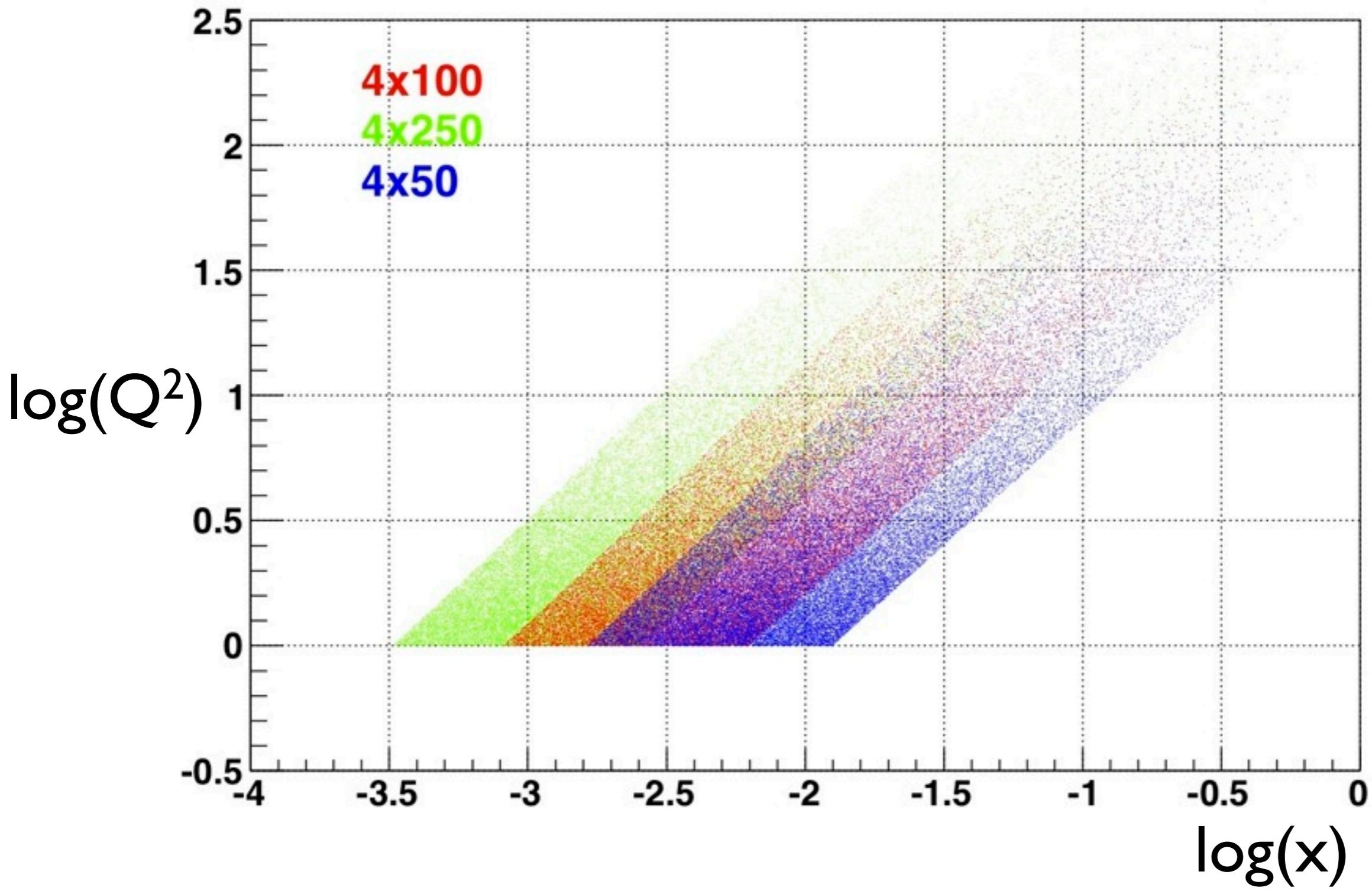
ROOT

- Object-oriented analysis framework written in C++.

- PYTHIA, RAPGAP and PEPSI output can all be converted to ROOT TTrees for analysis.

- Use a uniform track-wise format to simplify analysis.

xdvmp

- eXclusive Diffractive Vector Meson Production.

- Based on Kowalski/Motkya/Watt dipole model.

- Implements the b-Sat and b-CGC models for dipole cross section.

- See talk by Michael Savastio.

Kowalski, Motkya, Watt. PRD 74, 074016, 2006
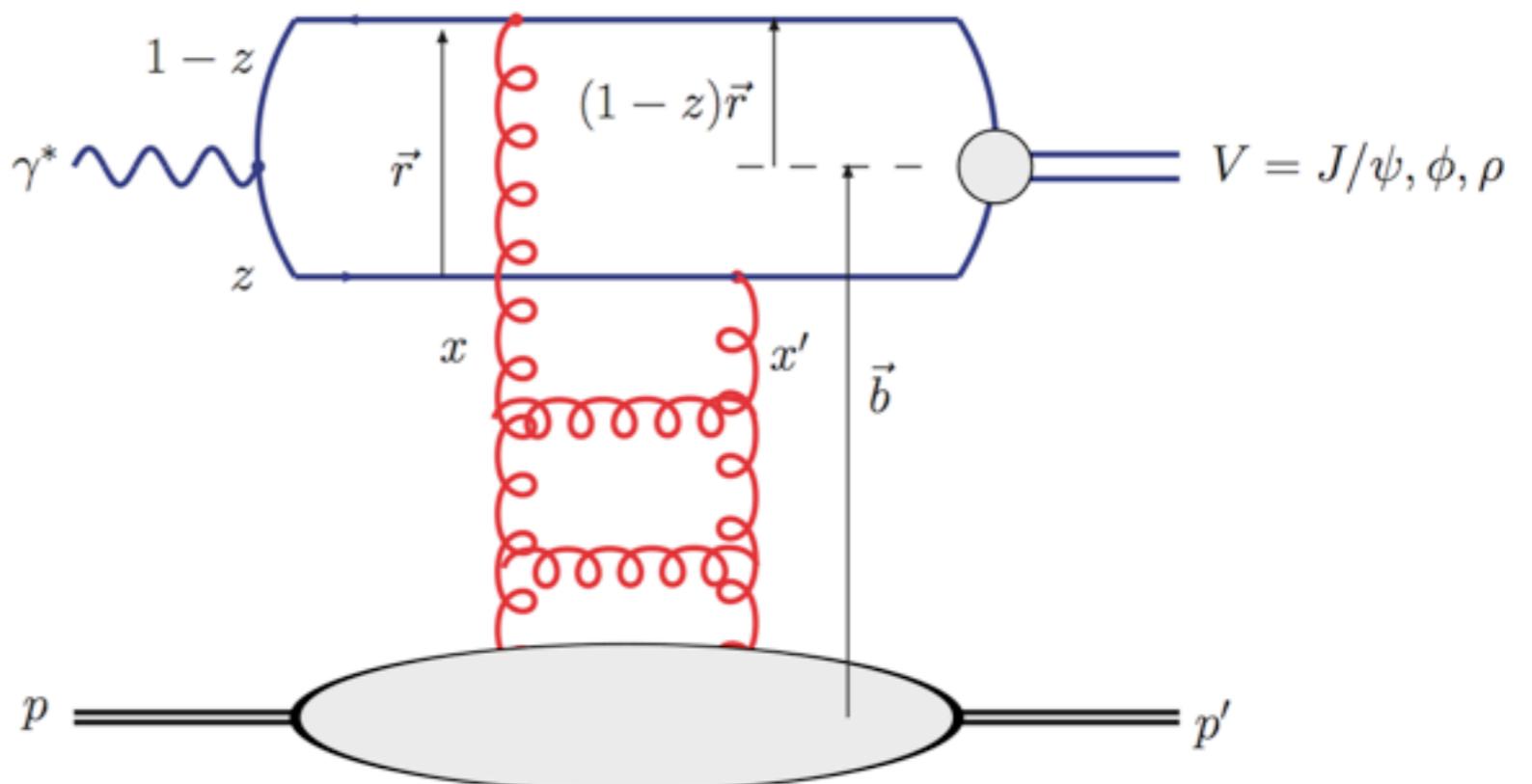
xdvmp

- Requires ROOT libraries and headers and GNU Scientific Library.

- Output is ROOT histograms.

- For J/ψ, φ and ρ production, e-p and e-A collisions.

ESIM

- Detector simulation for eRHIC based on GEANT 3.

- Uses a "geant language" to simplify the geometry description.

- The geometrical description of each part of the detector is written as a module that is then loaded into the framework.

- ESIM is available on the EIC AFS region:

  /afs/rhic.bnl.gov/eic/PACKAGES/ESIM

ESIM
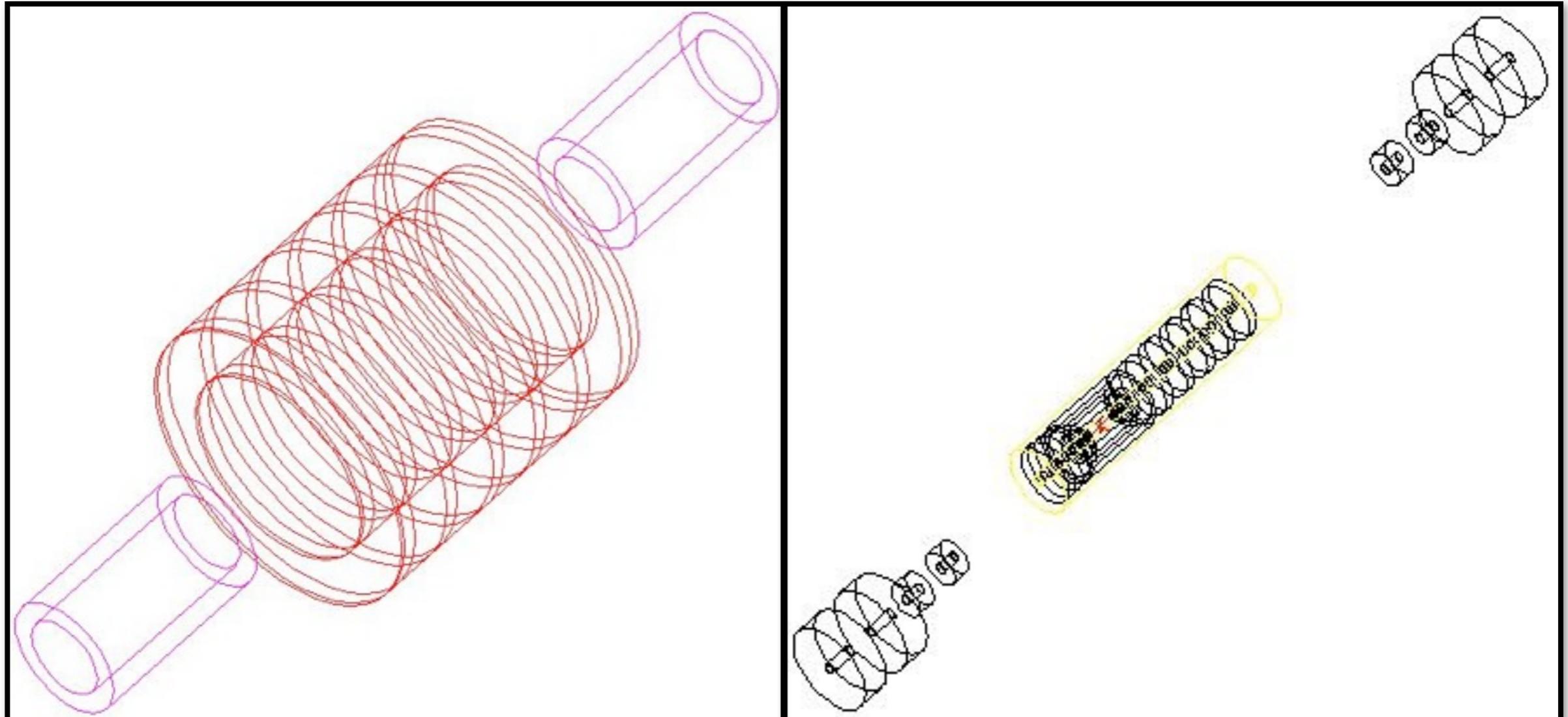
- See talk by Anders Kirleis.

ESIM
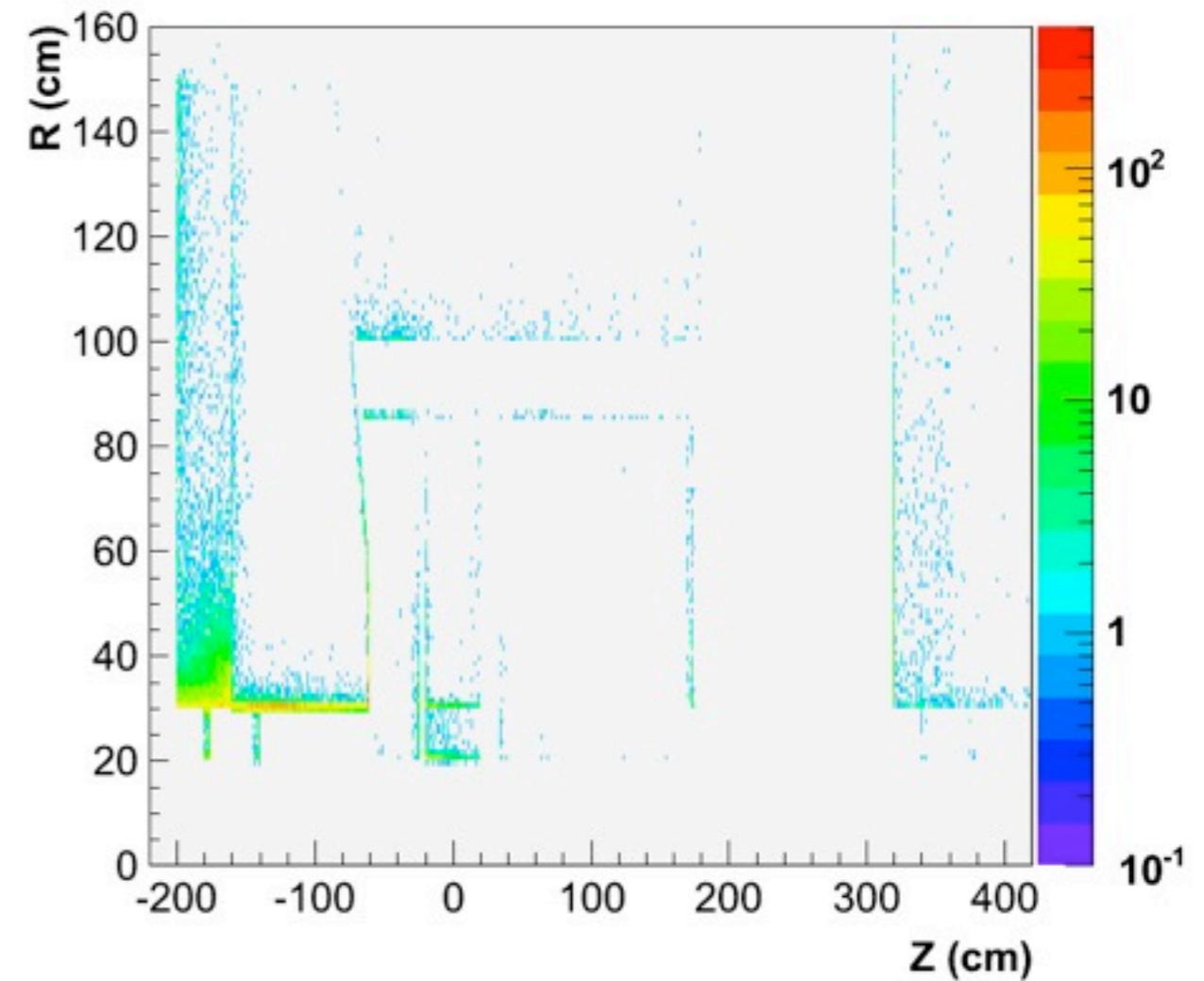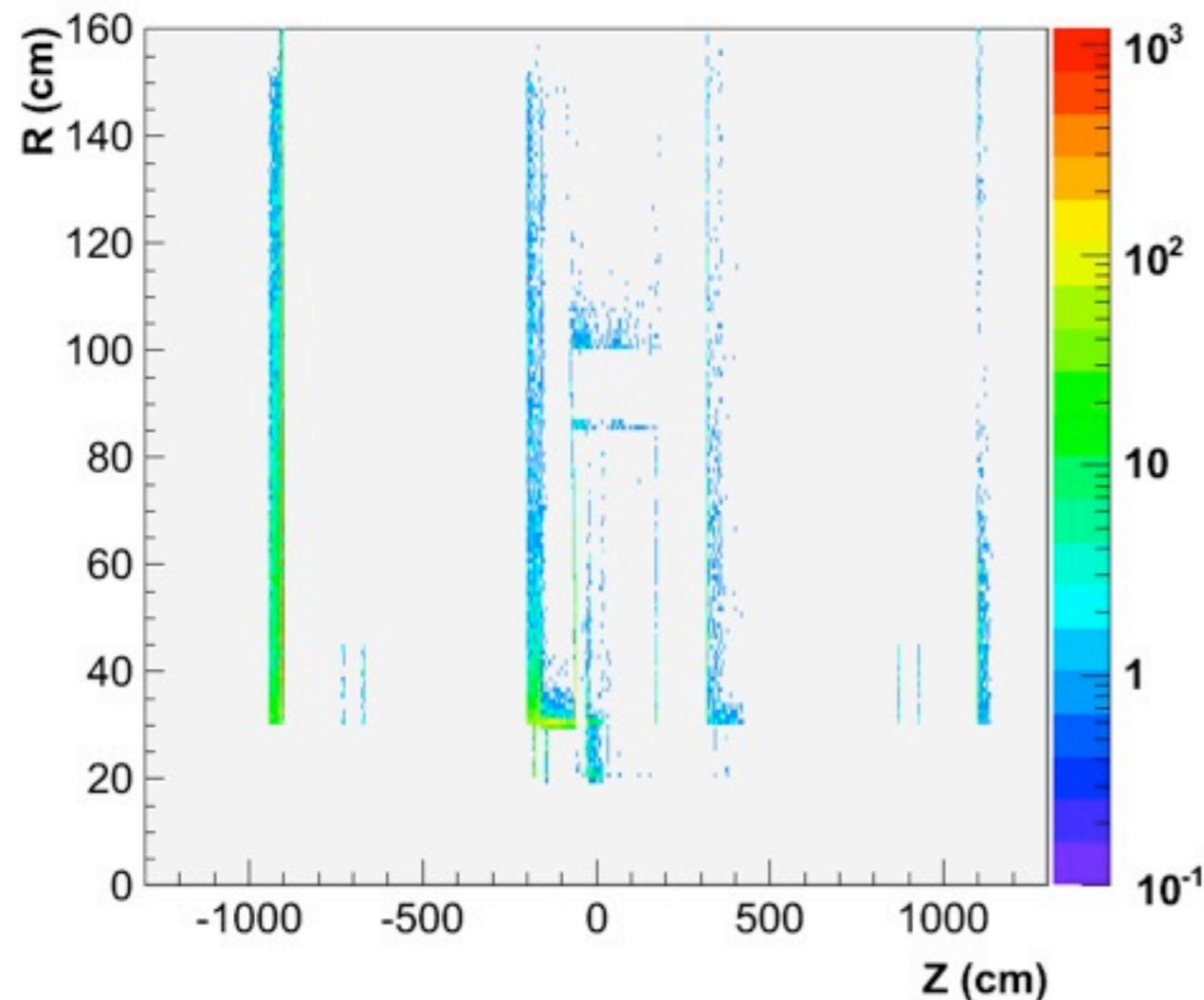
- See talk by Anders Kirleis.

Event generators in ESIM

- ESIM contains a particle gun.

- PYTHIA can be run directly in ESIM

  - code is compiled and loaded into ESIM as a shared library and can be run interactively.

- RAPGAP and PEPSI events can be replicated in ESIM.

Caldwell Detector
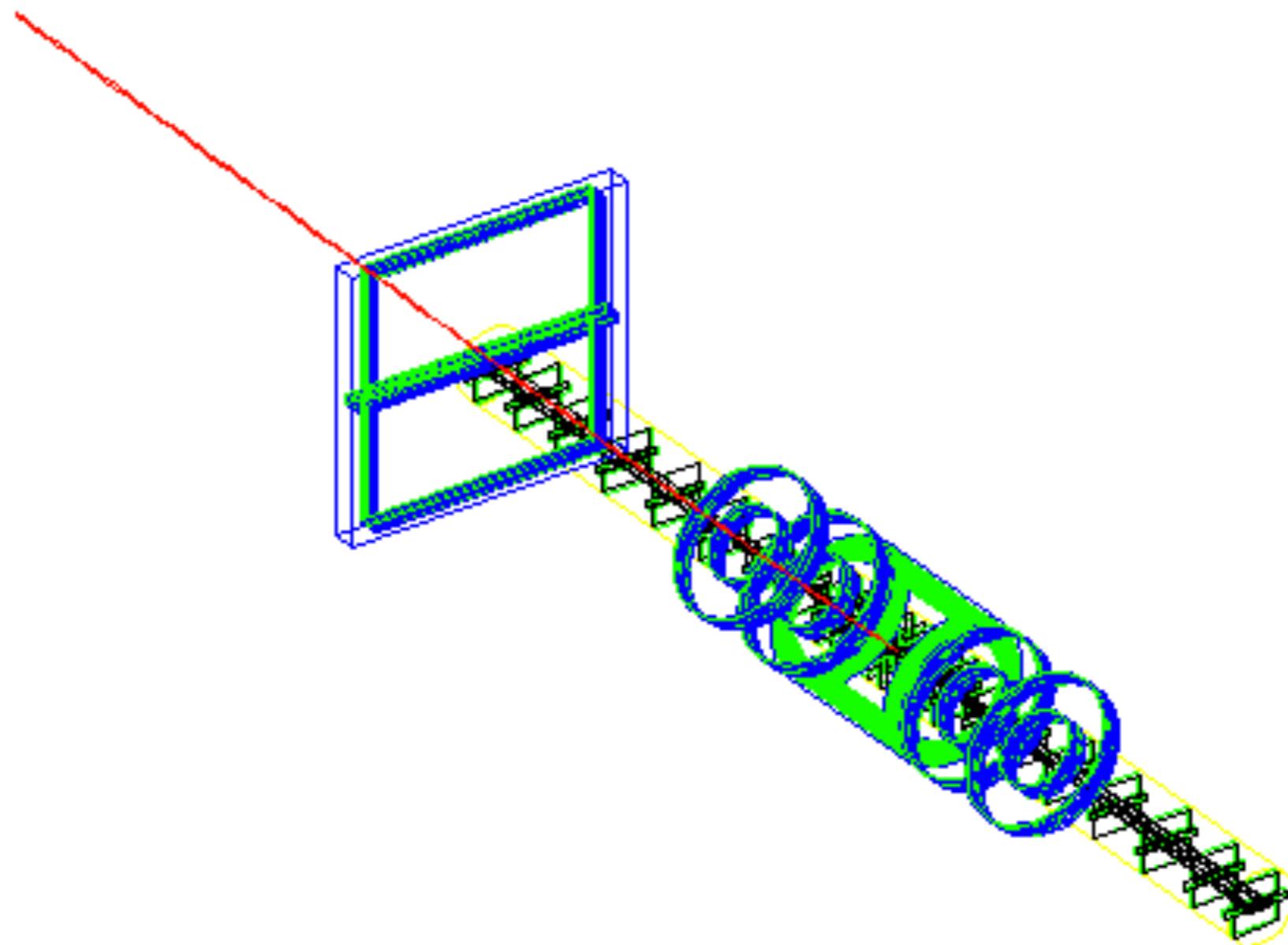
More on the way...

- A Monte Carlo event generator for e-A collisions is to be written.

- Investigating the study of Generalised Parton Distributions (GPDs) via Deeply Virtual Compton Scattering (DVCS) +....

- Investigating transverse spin physics in semi-inclusive DIS.

Getting involved

- RACF/AFS account.

- Sign up for the BNL EIC mailing list:

  eic-bnl-tf-l@lists.bnl.gov.

- BNL EIC Task Force meetings: Thursdays at 14:00 Eastern Time.