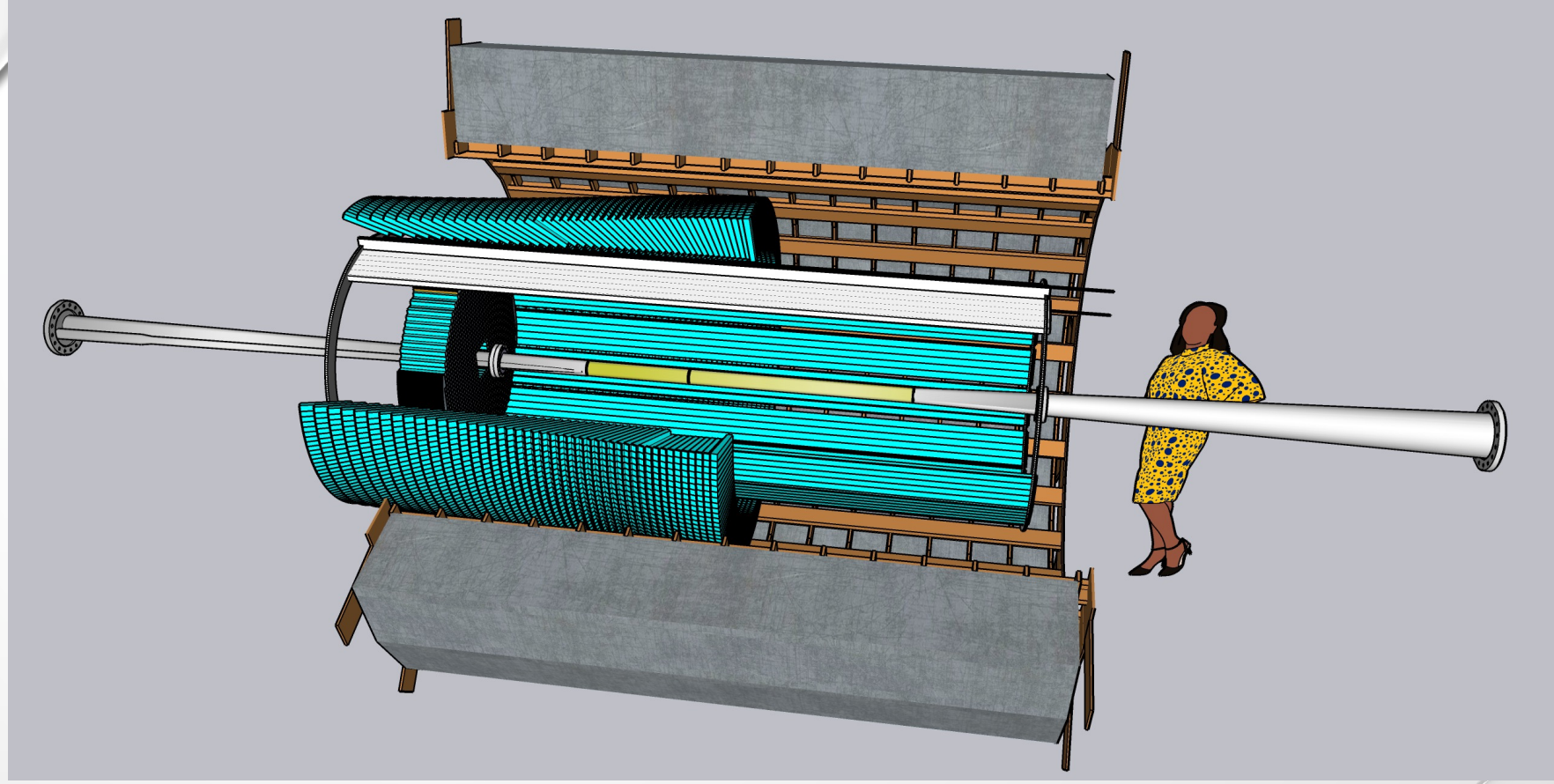
CORE SIMULATIONS



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indico.jlab.org/event/461/

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DOE, CFNS

OLD DOMINION
UNIVERSITY

DELPHES FastMC

http://dx.doi.org/10.1007/JHEP02(2014)057

- CORE Implemented by Duke U. REU student Joseph.Grassi@temple.edu
  - delphes_EIC_CORE_2.5T_Grassi.tcl file available: https://indico.jlab.org/event/461/contributions/8805/
- Instructions for installation of DELPHES in Joseph's talk https://indico.jlab.org/event/460/
  - Full Documentation: https://cp3.irmp.ucl.ac.be/projects/delphes
    Try the "Quick Tour" link for installation, basic introduction, etc
  - Installation (this worked on my MacBook Pro, BigSur). Install tcl-tk first
    git clone https://github.com/delphes/delphes.git
    setup bash environment variables
    source /[*my.path.to.installation*]/delphes/DelphesEnvOSX.sh

HepMC3 Input Format

- .tcl card setup for HepMC2 format (this available with a HepMC3 installation)
  - I have only implemented the ascii file format (similar to LUND)
  - Allows for much more meta-data than LUND or ROOT
  - gitlab.cern.ch/hepmc/HepMC3

- I installed with homebrew:

  >brew install hepmc3

  - Required bash environment variables

    > export HEPMCPATH="/usr/local/Cellar/hepmc3/3.2.2”

    > export CPLUS_INCLUDE_PATH=$HEPMCPATH/include

- Run DELPHES:

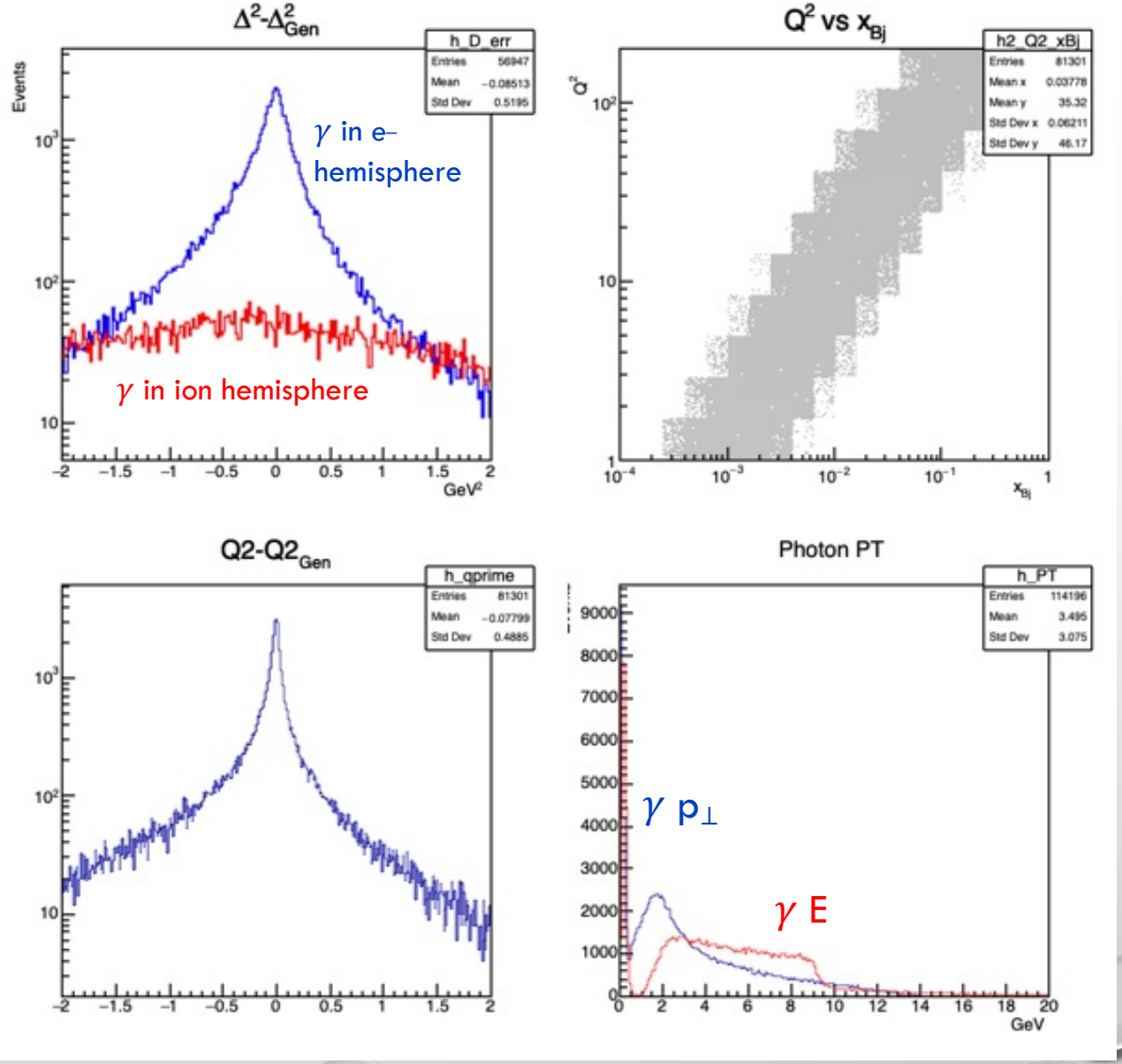
  >./DelphesHepMC2 cards/*control_card*.tcl [*output_root_file*] [*input HepMC2 file*]

Exclusive Processes
A personal journey with DELPHES, HEPMC, TOPEG

- I wrote a "simple" DVCS event generator (kinematics only)
  - Produced HepMC2 event files:
    - $ep \rightarrow ep\gamma$
    - $e+\alpha \rightarrow e+\alpha+\gamma$
  - Ran through DELPHES
  - Wrote a root script to interpret results
    - Looking for impact of High Res EMCal on kinematic reconstruction.
- Orsay-Perugia Coherent Nuclear DVCS code TOPEG used for Yellow Report simulations
  - Root event files at Jlab: /work/clas12/mhattawy/he4…. Need meta-data.
    - 18 GeV $\otimes$ 110 GeV α generated according to cross section
  - Just completed(?) a root macro to convert TOPEG file to HEPMC

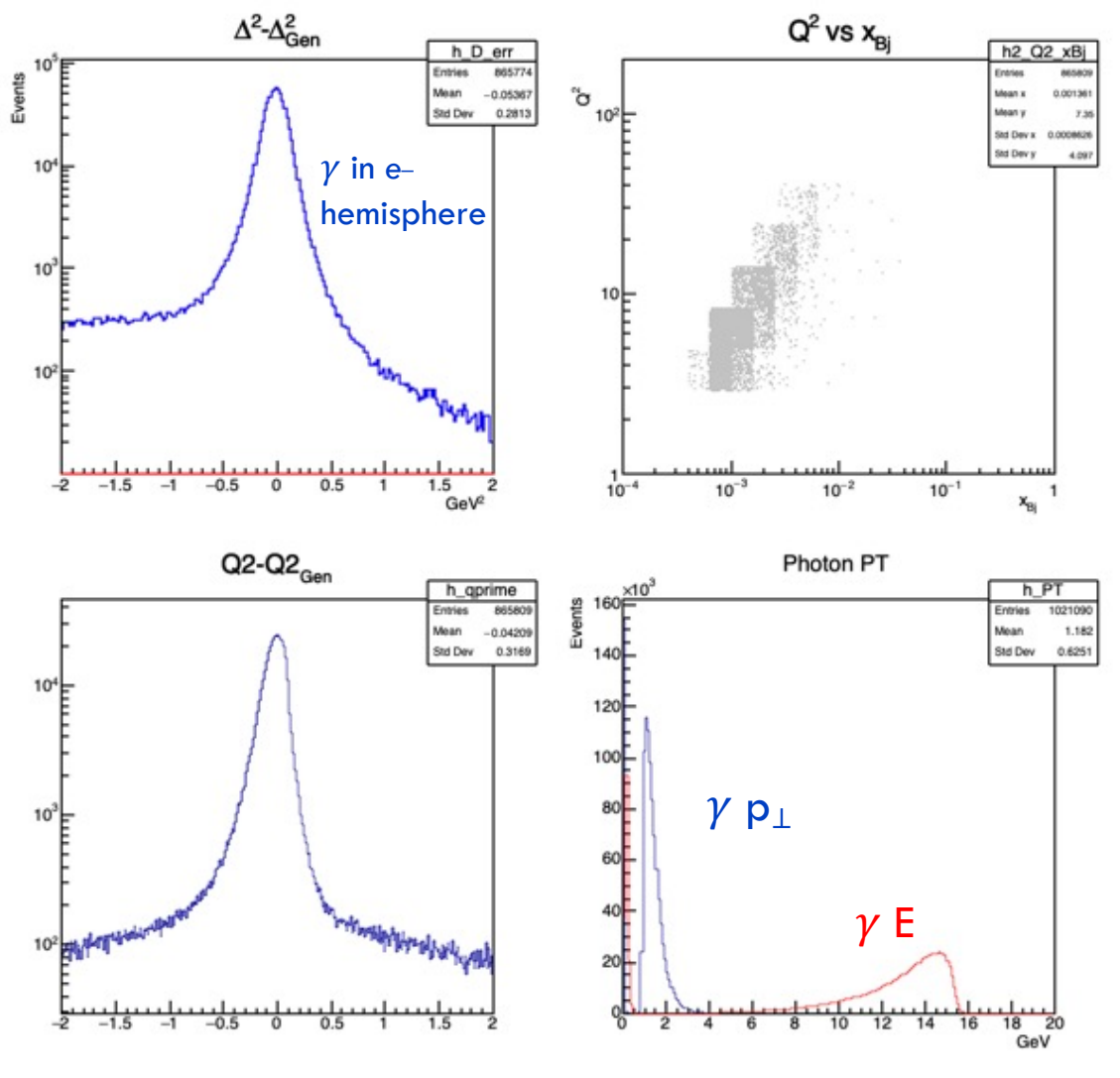
Proton DVCS in DELPHES (phase space only)

- Resolution distributions have narrow central "Gaussians"
- What is the kinematic domain and origin of very broad tails?



First pass TOPEG ^{4}He-DVCS in DELPHES (Cross section weighted)

1M events



For reference,
^{4}He first minimum
at $-t$=0.36 GeV^2