POETIC Workshop Series

MCEGs for future ep and eA facilities
POETIC Workshop Series

**Primary goal**
- following the efforts of the **INT-10-3** program
- continue advancing the field of EIC physics

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<th>March 19-23 2018</th>
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POETIC-8 Satellite Workshop on Monte Carlo Event Generators

MCEGs for future ep and eA facilities
March 22-23 2018

Organizers:

• EIC:
  - E.C. Aschenauer (BNL)
  - M. Diefenthaler (JLab)

• MCnet:
  - S. Plätzer (Vienna)
  - S. Prestel (FNAL)

Feedback

"I really learned a lot."

“The organization was great. I learned something interesting from basically every talk.”
Future ep/eA experiments

Matthew Wing (UCL / DESY)

- Introduction
- Current ep and eA results
- Possible future colliders
  - Electron–ion collider (EIC)
  - Large hadron–electron collider (LHeC) and future circular collider hadron–electron (FCC-he) collider
  - Very high energy electron–proton (VHEeP) collider
  - Issues and needs for Monte Carlos
- Summary and outlook

POETIC-8, MCEG Workshop — 22–23 March 2018, University of Regensburg

- MCEG not about tuning but about physics
- multi-leg NLO matching with parton showers
- ready to work on ep/eA


General-purpose event generators (Sherpa missing)

Herwig 7

Stefan Gieseke

Institut für Theoretische Physik
KIT

MCEGs for future ep and eA colliders
Regensburg, 22–23 Mar 2018

ep in Pythia 8

POETIC-8 Satellite Workshop on Monte Carlo Event Generators

Ilkka Helenius
March 23rd, 2018
Tübingen University
Institute for Theoretical Physics

- huge potential for DIS simulations
- first DIS implementation

- DIS
- photoproduction
- hard diffractive photoproduction
MC tools

- ESC project on radiative correction library
- make DIS analysis available (RIVET)
- include DIS data in standard tunes
- Sherpa DIS comparisons
Novel QCD phenomena

TMDs from parton branching and parton showers in MC event generators

Hannes Jung (DESY) in collaboration with
A. Bermudez-Martinez, F. Hautmann, A. Lelek, V. Radescu, R. Ziebck
M. Bury, A. van Hameren, K. Kutak, S. Sapeta, M. Serino

• Why TMDs are needed
  • TMDs for hadron-hadron collisions

• New developments
  • parton branching algorithm to solve evolution equations
  • benchmark tests
  • advantages for integrated PDFs
  • determination of TMD densities at NLO with xFitter

• Application to DY production
• Application to TMD parton showers

arTeMiDe

Alexey A. Vladimirov
Institut für Theoretische Physik
Universität Regensburg

MCEGs for future ep and eA facilities
Regensburg
March 22, 2018

• unintegrated PDFs
• include TMD factorization and evolution

• TMD distributions
• TMD evolution
• TMD cross-sections
eA: interesting prospect

**BeAGLE:**
Benchmark eA Generator for LEptoproduction
hard interaction + nuclear response

Mark D. Baker*
MDBPADS Consulting
E.C. Aschenauer, J.H. Lee
Brookhaven National Laboratory
L. Zheng
China Univ. Of Geosciences (Wuhan)

22 March 2018

* Contact: mdbaker@mdbpads.com (@bnl.gov, @lab.org)

**collaborate with BeAGLE**

CGC + Pythia6

**Lessons from MCEG at small-x for p+p/A, A+A : sampling nuclei for EIC**

Prithwish Tribedy

Monte Carlo Satellite workshop of the POETIC-8
March 23-24, 2018, University of Regensburg, Germany
Discussion on MCEG R&D

- **MCEG R&D** requires *easy access to data*
- data := detailed analysis description / analysis + analysis results

- **HEP**: existing workflow for MCEG R&D using tools such as Rivet and Professor

- **Workshop discussion**:
  - What would be needed from HEP analysis tools to leverage them for NP as well?
  - How could we make the HERA data available?
Summary

- **POETIC:**
  - incubator for ideas

- **MCEG for future ep and eA facilities**
  - collaboration with MCnet
  - write-up on requirements
  - 2019 workshop