Simulation & Reconstruction Status

ATHENA COLLABORATION MEETING
Friday 2021-09-17

The Software and Computing WG Conveners:
Andrea Bressan (University of Trieste and INFN) ,
Dmitry Romanov (Jefferson lab) ,
Sylvester Joosten (Argonne National Laboratory) ,
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Simulation status

"Canyonlands" geometry
- ✅ Central calorimetry ready for proposal
  - ❌ Optimize ECAL/HCAL acceptance? (near beampipe and corner of BHCAL blocking PECAL)
- ✅ Hybrid tracker version 2.0 fully functional
  - 🚧 Iterative changes to geometry
  - ❌ Integrate first BECAL silicon layer into tracking geometry
- ✅ Forward/backward RICH fully functional
 - 🚧 2-mirror design for dRICH
  - 🚧 better pfRICH services
- ✅ 12-sided "Fake-DIRC"
  - ❌ Fix geometric overlaps in DIRC
- ✅ Realistic central beampipe
  - ❌ Beampipe needs 50cm extension in forward direction.
- ✅ B0 tracker/preshower ready for proposal
- ✅ Forward beamline, including RPs and OMDs ready for proposal
  - 🚧 Detect beam energy setup in HepMC file to automatically set FF magnets
- 🚧 ZDC redesign almost complete
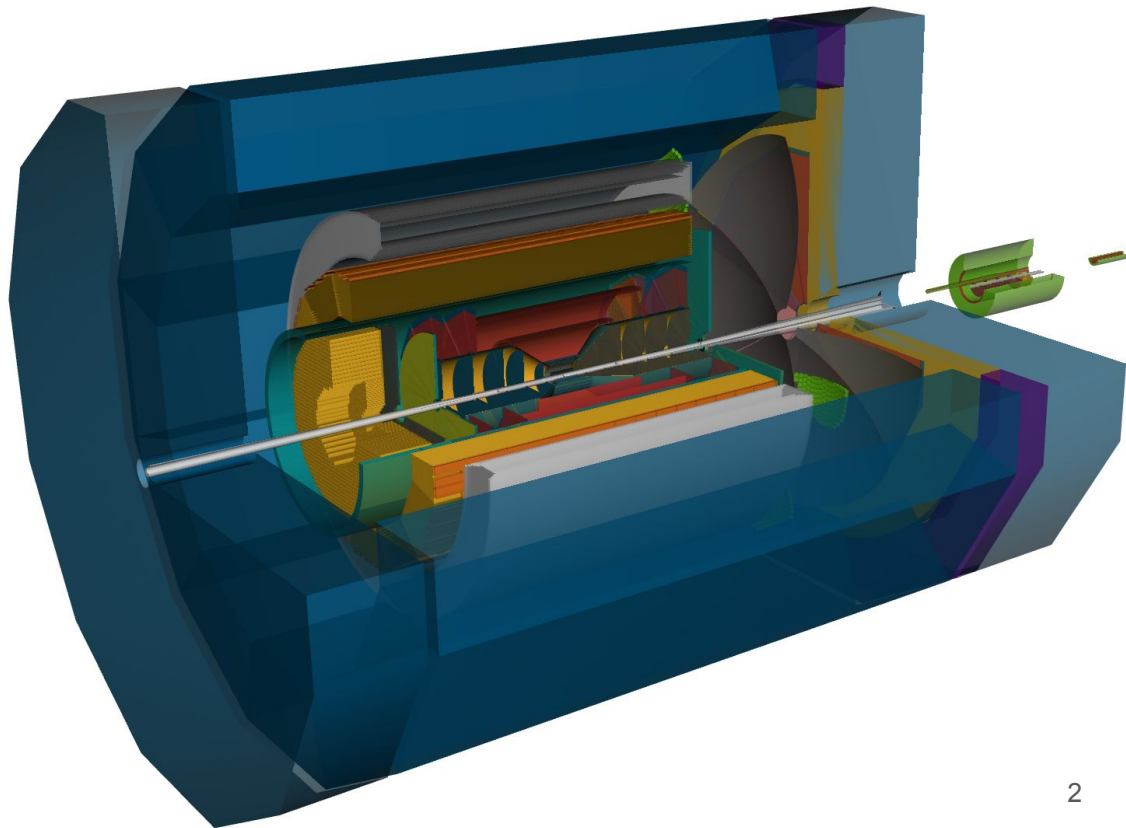
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Reconstruction status

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Status

- ✅ ECAL reconstruction ready
  - 🚧 Validate calorimetry digitization for BECAL
- ✅ Tracking with ACTS working well
  - 🚧 Validation + fine-tuning material effects
  - ❌ Add B0 (after proposal deadline)
  - 🚧 Realistic vertexing
- ✅ Neutral particle reconstruction
- 🚧 Realistic PID
  - ✅ Truth PID for all particles
  - 🚧 IRT for dRICH/pfRICH
  - ❌ DIRC reconstruction
  - ❌ e/π separation using calorimetry+PID
- ✅ Inclusive kinematic reconstruction
  - 🚧 Tune algorithms
- 🚧 FF reconstruction
  - ✅ Fast FF reconstruction
  - ✅ RP/OMD proton reconstruction
  - 🚧 ZDC reconstruction

First results – electron method I

$0.50 < y_{true} < 0.80$

$0.20 < y_{true} < 0.50$

$0.10 < y_{true} < 0.20$

$0.05 < y_{true} < 0.10$

$0.01 < y_{true} < 0.05$

18 GeV e⁻ on 275 GeV p, √s=141 GeV

$Q^2 > 10\ GeV^2$
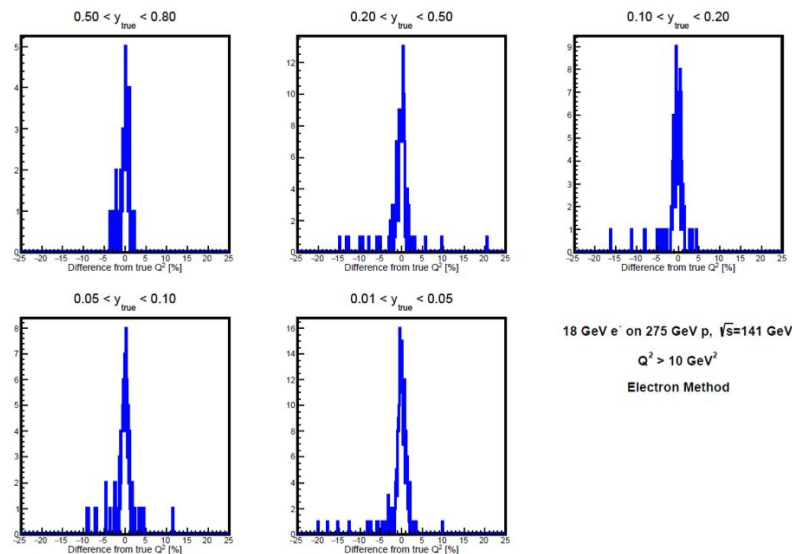
Electron Method

Full simulation/reconstruction DIS events with electron method (Jacquet-Blondel and double-angle also available)
Implementation and results courtesy of Barak Schmookler

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Computing and Support

Getting started:
`curl -L get.athena-eic.org | bash`

[Full simulation tutorials](#)

eic-ip6-software-l@lists.bnl.gov
#software-helpdesk on Slack

1. Large production running right now!
2. **#software-helpdesk office hours every week: Mo-We-Fr at 2:00pm EDT** https://zoom.us/j/93744567735.
3. In case of questions/issues, you can reach us at Slack (**#software-helpdesk**), or by [creating an issue on eicweb](#).