Fun4all simulation submission procedure
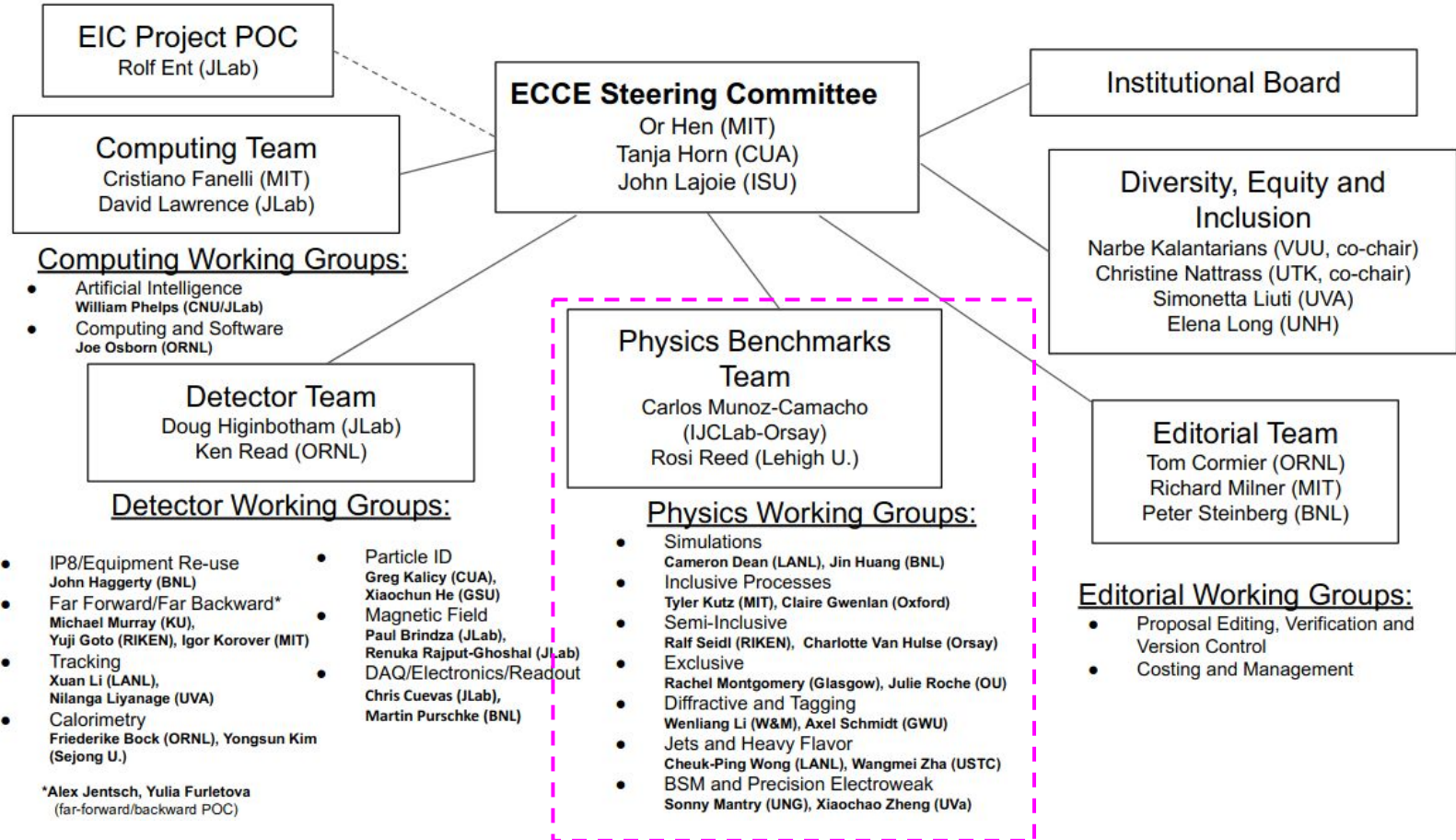
May 16

Cameron Dean, Jin Huang, Joe Osborn, Bill Li

Overall scope during the proposal

EIC Project POC
Rolf Ent (JLab)

Computing Team
Cristiano Fanelli (MIT)
David Lawrence (JLab)

Computing Working Groups:
- Artificial Intelligence
  William Phelps (CNU/JLab)
- Computing and Software
  Joe Osborn (ORNL)

Detector Team
Doug Higinbotham (JLab)
Ken Read (ORNL)

Detector Working Groups:
- IP8/Equipment Re-use
  John Haggerty (BNL)
- Far Forward/Far Backward*
  Michael Murray (KU),
  Yuji Goto (RIKEN), Igor Korover (MIT)
- Tracking
  Xuan Li (LANL),
  Nilanga Liyanage (UVA)
- Calorimetry
  Friederike Bock (ORNL), Yongsun Kim
  (Sejong U.)

*Alex Jentsch, Yulia Furletova
(far-forward/backward POC)

- Particle ID
  Greg Kalicy (CUA),
  Xiaochun He (GSU)
- Magnetic Field
  Paul Brindza (JLab),
  Renuka Rajput-Ghoshal (JLab)
- DAQ/Electronics/Readout
  Chris Cuevas (JLab),
  Martin Purschke (BNL)

ECCE Steering Committee
Or Hen (MIT)
Tanja Horn (CUA)
John Lajoie (ISU)

Physics Benchmarks Team
Carlos Munoz-Camacho
(IJCLab-Orsay)
Rosi Reed (Lehigh U.)

Physics Working Groups:
- Simulations
  Cameron Dean (LANL), Jin Huang (BNL)
- Inclusive Processes
  Tyler Kutz (MIT), Claire Gwenlan (Oxford)
- Semi-Inclusive
  Ralf Seidl (RIKEN), Charlotte Van Hulse (Orsay)
- Exclusive
  Rachel Montgomery (Glasgow), Julie Roche (OU)
- Diffractive and Tagging
  Wenliang Li (W&M), Axel Schmidt (GWU)
- Jets and Heavy Flavor
  Cheuk-Ping Wong (LANL), Wangmei Zha (USTC)
- BSM and Precision Electroweak
 Sonny Mantry (UNG), Xiaochao Zheng (UVa)

Institutional Board

Diversity, Equity and Inclusion
Narbe Kalantarians (VUU, co-chair)
Christine Nattrass (UTK, co-chair)
Simonetta Liuti (UVA)
Elena Long (UNH)

Editorial Team
Tom Cormier (ORNL)
Richard Milner (MIT)
Peter Steinberg (BNL)

Editorial Working Groups:
- Proposal Editing, Verification and
  Version Control
- Costing and Management

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Overall scope during the proposal

Physics Benchmarks Team
Carlos Munoz-Camacho
(IJCLab-Orsay)
Rosi Reed (Lehigh U.)

Physics Working Groups:

- Simulations
  Cameron Dean (LANL), Jin Huang (BNL)
- Inclusive Processes
  Tyler Kutz (MIT), Claire Gwenlan (Oxford)
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- BSM and Precision Electroweak
  Sonny Mantry (UNG), Xiaochao Zheng (UVa)

Simulation QA group
- Led by Cameron and Dean
- **Setting up production branches**
- **Simulation production with large data samples**
- **Document the production configurations**

Bill as Diffractive and Tagging Liaison to the simulation group
- **Special branches with beam parameters**
- **Simulation production with large data samples**

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Large Pythia production vs Special Generator Production

Large data production
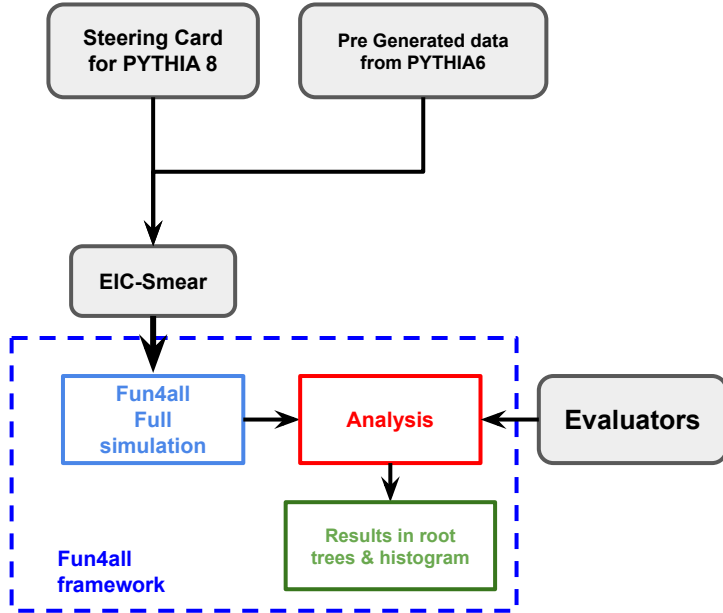
Used for SIDIS, Jets, detector studies

Complications and challenges:
- Resource demanding

Special generator
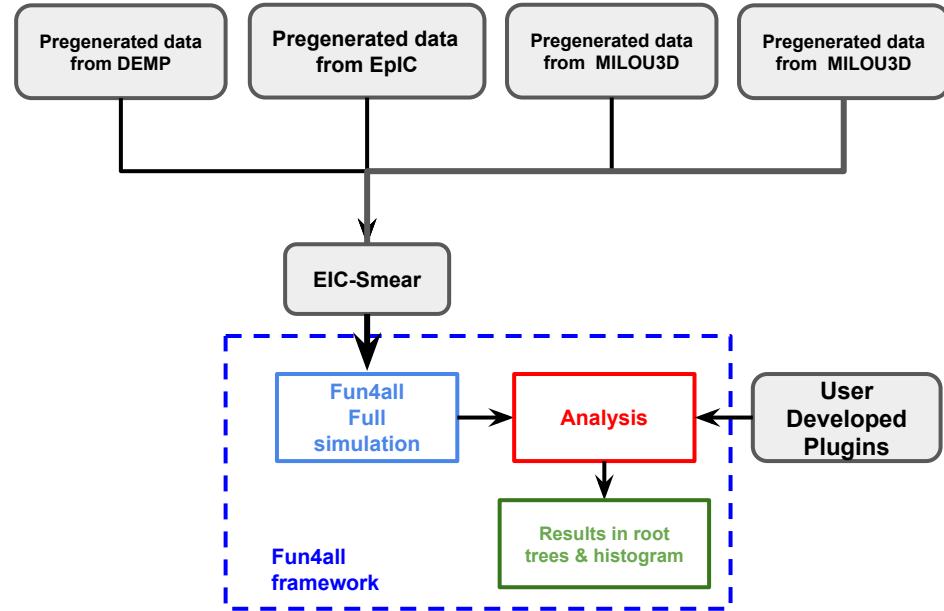
Used for Exclusive, Diffractive and Tagging

Complications and challenges:
- Tedious in setup
- Hard to validate

Job Submission Tool Kits

https://github.com/ECCE-EIC/productions

BNL   **JLab**   **MIT**
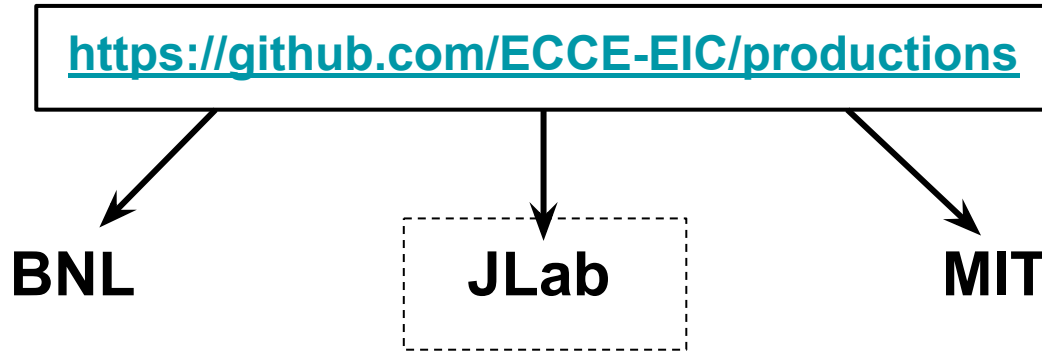
Configuration option file → | configurations.py | Updated to prop.7.0 (#47) | 4 months ago |
| | configurations.pyc | Bills branch (#25) | 8 months ago |
| | setup.sh | Streamline installation and submission and documentation. (#18) | 10 months ago |
Master script → | setupProduction.py | Updated to prop.7.0 (#47) | 4 months ago |
JLab setup script → | setup_eic_JLAB.csh | Bills branch (#25) | 8 months ago |
| | submit_diff_tagg.sh | Bills branch (#25) | 8 months ago |

Instruction for submission

- **Working folder at JLab: /work/eic/users/billlee/productions (feel free to directly copy over)**

- **execute command:**
  - **source setup_eic_JLAB.csh**
  - **python3 setupProduction.py JLAB productionSetups/run_ExclusiveReactions_MILOU3D_ep-5x41-DVCS-BH-hi_div-IP6.txt**
  - **/w/eic-scshelf2104/users/billlee/productions/submissionFiles/ExclusiveReactions/MILOU3D/ep-5x41-DVCS-BH-hi_div-IP6/slurmJobs/submitJobs.sh**

```
SLURM submission files have been written to:
/w/eic-scshelf2104/users/billlee/productions/submissionFiles/ExclusiveReactions/MILOU3D/ep-5x41-DVCS-BH-hi_div-IP6/slurmJobs
This setup will submit 1000 jobs
You can submit your jobs with the script:
/w/eic-scshelf2104/users/billlee/productions/submissionFiles/ExclusiveReactions/MILOU3D/ep-5x41-DVCS-BH-hi_div-IP6/slurmJobs/submitJobs.sh
====== Your production details ======
ECCE nightly: ana.57
ECCE macros repo: https://github.com/billlee77/macros.git
ECCE macros tag: prop.7.1-production-DiffractiveAndTagging-IP6-41GeV-hi_div-r10, hash: Diff_Tagg_IP6_41GeV_hi_div-r10-prop.7.1
ECCE macros directory: /work/eic2/ECCE/PRODUCTION/MACROS/ECCE_build_ana.57/macros_tag_prop.7.1-production-DiffractiveAndTagging-IP6-41GeV-hi_div-r10
PWG: ExclusiveReactions
Generator: MILOU3D
Collision Type: ep-5x41-DVCS-BH-hi_div-IP6
Number of events per file: 1000
```

Instruction for submission

python3 setupProduction.py JLAB productionSetups/run_ExclusiveReactions_MILOU3D_ep-5x41-DVCS-BH-hi_div-IP6.txt

Master script

Job Location

Frozen build version database, evaluator

Input file

Production branch name

```
nightly ana.57
tag prop.7.1-production-DiffractiveAndTagging-IP6-82GeV-hi_acc-r10
PWG ExclusiveReactions
generator topeg
collision eA-5x41_Nh-hi_acc-DVCS-IP6
nTotalEvents 1000000
```

beam

ep energy

Beam parameterization

Process

IP Choice

Simulation Branches

- June Concept (prop.2): a test

- **July Concept (prop.4):** proposal concept

- October Concept (prop.5): AI tracking capability added

- **January Concept (prop.7.1): slight correction, adding ep high divergence, ep high acceptance and eA scattering parameterization [production effort still on going to support ECCE publications]**
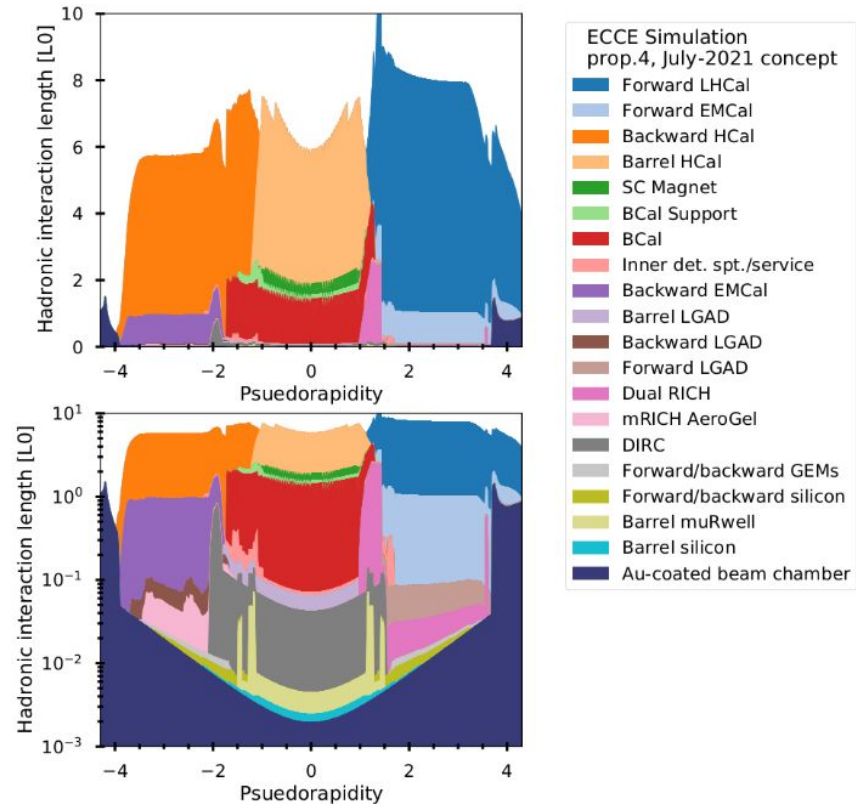
prop.4 material budget in simulation by Cameron and Jin

Why was the **special generator** simulation so **tedious?**

Physics topic	Generator	Section	Objective
Pion Form Factor	DEMPGen [28]	Sec. 4.1	#4
π Structure Function	EIC_mesonMC [29]	Sec. 4.2	#4
Double Tagged e-He3	DJANGOH [30]	Sec. 4.3	#1
ep DVCS	MILOU3D [31, 32]	Sec. 4.4	#2
eA DVCS via e-He4	TOPEG [33]	Sec. 4.5	#3
ep DEMP J/ψ	LAGER [34]	Sec. 4.6	#4
TCS	EPIC [35]	Sec. 4.7	#2
XYZ Spectroscopy	elSpectro [36]	Sec. 4.8	#5

ep energy
5x41
5x100
10x100
18x275
eA energy

Three options:
hi-div, hi-acc, eA

```
nightly ana.57
tag prop.7.1-production-DiffractiveAndTagging-IP6-82GeV-hi_acc-r10
PWG ExclusiveReactions
generator topeg
collision eA-5x41_Nh-hi_acc-DVCS-IP6
nTotalEvents 1000000
```

beam

ep energy

Beam parameterization

Process

IP Choice

IP6 or IP8

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Why was the **special generator** simulation so **tedious?**

Diff_Tagg_IP8_41GeV-hi_div-r10-prop.7.1 ···
29 days ago · ba6fcd7 · zip · tar.gz

Diff_Tagg_IP8_41GeV-hi_acc-r10-prop.7.1 ···
29 days ago · d6a3c7d · zip · tar.gz

Diff_Tagg_IP8_5x41GeV-hi_div-r10-prop.7.1 ···
on Apr 19 · 29693d1 · zip · tar.gz

Diff_Tagg_IP8_5x41GeV-hi_acc-r10-prop.7.1 ···
on Apr 19 · 981243a · zip · tar.gz

Diff_Tagg_IP6_41GeV-hi_div-r10-prop.7.1 ···
on Apr 19 · 6357fa7 · zip · tar.gz

Diff_Tagg_IP6_41GeV-hi_acc-r10-prop.7.1 ···
on Apr 19 · a0115a0 · zip · tar.gz

Diff_Tagg_IP6_41GeV-eA-r10-prop.7.1 ···
on Apr 18 · 0ccc1a4 · zip · tar.gz

Diff_Tagg_IP6_5x102GeV-eA-r10-prop.7.1 ···
on Apr 18 · 63dad89 · zip · tar.gz

Diff_Tagg_IP8_10x100GeV-hi_div-r10-prop.7.1 ···
on Apr 11 · 6295bba · zip · tar.gz

Diff_Tagg_IP8_10x100GeV-hi_acc-r10-prop.7.1 ···
on Apr 11 · f75f929 · zip · tar.gz

Diff_Tagg_IP8_5x100GeV-hi_div-r10-prop.7.1 ···
on Apr 11 · a95bcb4 · zip · tar.gz

Diff_Tagg_IP8_5x100GeV-hi_acc-r10-prop.7.1 ···
on Apr 11 · 413f9d1 · zip · tar.gz

Diff_Tagg_IP6_10x249GeV-eA-r10-prop.7.1 ···
on Apr 6 · 3815ea0 · zip · tar.gz

Diff_Tagg_IP8_82GeV-hi_div-r10-prop.7.1 ···
on Mar 30 · a548000 · zip · tar.gz

Diff_Tagg_IP8_82GeV-hi_acc-r10-prop.7.1 ···
on Mar 30 · 3a3d8bd · zip · tar.gz

Diff_Tagg_IP8_275GeV-hi_div-r10-prop.7.1 ···
on Mar 24 · 951e5c5 · zip · tar.gz

Diff_Tagg_IP8_275GeV-hi_acc-r10-prop.7.1 ···
on Mar 24 · 568cb38 · zip · tar.gz

Diff_Tagg_IP6_10x100GeV-hi_div-r10-prop.7.1 ···
on Mar 12 · 88c3e79 · zip · tar.gz

Diff_Tagg_IP6_10x100GeV-hi_acc-r10-prop.7.1 ···
on Mar 12 · a20bdb0 · zip · tar.gz

Diff_Tagg_IP6_5x100GeV-hi_div-r10-prop.7.1 ···
on Mar 12 · bbb66eb · zip · tar.gz

ep energy
5x41
5x100
10x100
18x275
eA energy

Three options:
hi-div, hi-acc, eA

```
nightly ana.57
tag prop.7.1-production-DiffractiveAndTagging-IP6-82GeV-hi_acc-r10
PWG ExclusiveReactions
generator topeg
collision eA-5x41_Nh-hi_acc-DVCS-IP6
nTotalEvents 1000000
```

Beam

ep energy

Process

Beam parameterization

IP Choice

IP6 or IP8

https://github.com/billlee77/macros/tags

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Documentation

Overall ECCE Simulation Status:

https://wiki.bnl.gov/eicug/index.php/ECCE_Simulations_Working_Group

Far Forward Simulation Status:

https://docs.google.com/spreadsheets/d/1VFthz9dogk1DCxgdEtdiuPmTbxXhwVgyXeqCbPmswRw/edit?usp=sharing

July concept, labelled prop.4.0

PWG	Process	Generator	Beam Parameters	No. Events Requested	No. Events In Storage	Notes	Assigned To
General	Single Pions	Particle Gun	N/A	5M	4.9M	**xrootd:** root://dtn-eic.jlab.org/work/eic2/ECCE/MC/prop.4/prop.4.0/General/particleGun/singlePion **S3 (eval only):** eicS3/eictest/ECCE/MC/prop.4/prop.4.0/General/particleGun/singlePion/eval_00000/ **OR** eicS3/eictest/ECCE/MC/prop.4/prop.4.0/General/particleGun/singlePion/eval_00001/	JLab / BNL
Diff. & Tag.	Pion Structure	EIC_mesonMC	10x100 ep	0.74M	0.74M	**xrootd:** root://dtn-eic.jlab.org/work/eic2/ECCE/MC/prop.4/prop.4.0/DiffractiveAndTagging/EIC_mesonMC/ep-10x100-PiStruc-IP6	Bill
Diff. & Tag.	Pion Structure	EIC_mesonMC	5x100 ep	0.53M	0.53M	**xrootd:** root://dtn-eic.jlab.org/work/eic2/ECCE/MC/prop.4/prop.4.0/DiffractiveAndTagging/EIC_mesonMC/ep-5x100-PiStruc-IP6	Bill
Diff. & Tag.	Pion Structure	EIC_mesonMC	5x41 ep	0.25M	0.25M	**xrootd:** root://dtn-eic.jlab.org/work/eic2/ECCE/MC/prop.4/prop.4.0/DiffractiveAndTagging/EIC_mesonMC/ep-5x41-PiStruc-IP6	Bill
Diff. & Tag.	Pion Structure	EIC_mesonMC	18x275 ep	1.24M	1.24M	**xrootd:** root://dtn-eic.jlab.org/work/eic2/ECCE/MC/prop.4/prop.4.0/DiffractiveAndTagging/EIC_mesonMC/ep-18x275-PiStruc-IP6	Bill

Conclusion and Future thoughts

- **We achieved the objective (support the proposal).**

Future thoughts for improvement

- What need to change: **automated setup script** and **documentation**