



# Introduction to EIC Yellow Report Tracking Working Group

**1<sup>st</sup> EIC Yellow Report Workshop @ Temple University**

Kondo Gnanvo

**University of Virginia**



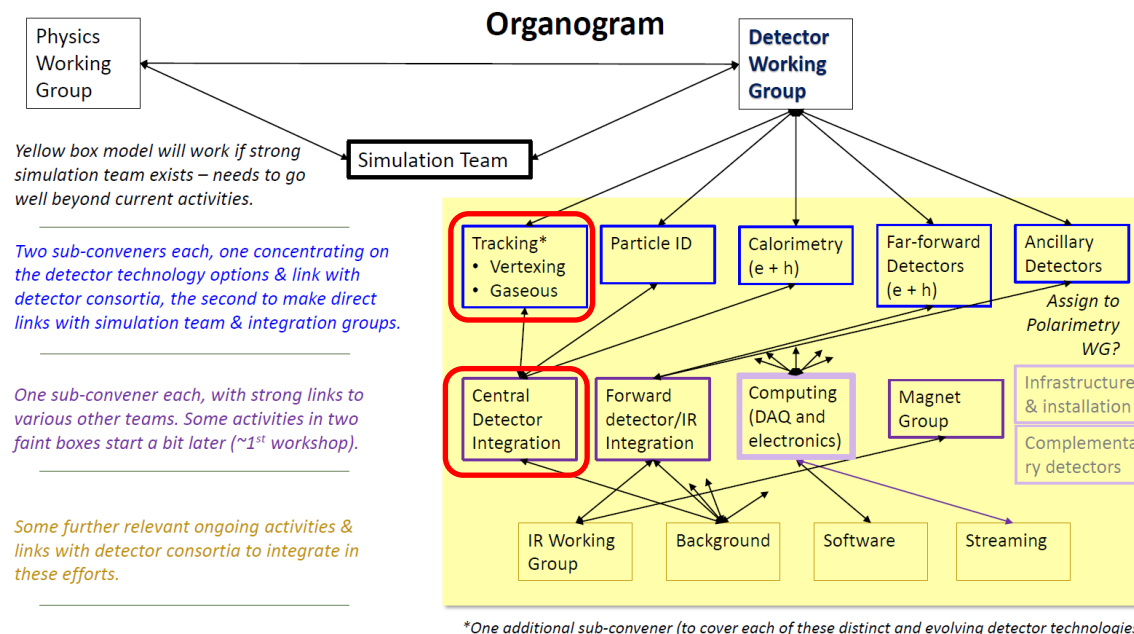
# Introduction to YR-Tracking Working Group

## Yellow Report:

Kick-off Meeting @ MIT Dec 2019

### ⇒ 3 Main Working Groups

- Physics Working Group
- Detector Working Group
- Accelerator Working Group



⇒ **Tracking Working Group:** In charge of the Tracking Technologies in both **Barrel** and the **End Caps** regions (i.e. not Far Forward / Backward)

⇒ **Convener:** **Peter Jones** (University of Birmingham):

⇒ **sub conveners:**

- **Annalisa Mastroserio & Domenico Elia** (INFN Bari) ⇒ Simulation and Integration Coordination
- **Kondo Gnanvo** (University of Virginia) ⇒ Gaseous Detectors
- **Leo Greiner** (UC Berkeley) ⇒ Silicon Detectors
- **eRD6 and eRD22 link to YR-Tracking-WG:** **Matt Posik** (Temple University)



# Main Goals for the YR-Tracking-WG

## Towards an EIC Yellow Report

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- What is needed for the Yellow Report? (to be discussed)
  - Survey of relevant technology options
  - Status of current R&D and highlight where further R&D is needed
  - Detector requirements (input from physics WG)
  - Define detector layout and performance – table and figures:
    - e.g.  $\Delta p_{(T)}/p_{(T)}$  versus  $p_{(T)}$ ;  $\sigma_{xy}$  versus  $p_T$ ;  $M_{inv}$
- How to proceed?
  - Things to discuss and keep in mind
    - Identify areas of interest / expertise
    - Common simulation framework / geometry / integration and magnet
    - Define a list of tasks / who will do what / simulation needs
    - Evaluate different technology options – also complementary detector
    - Moving forward – a repository of performance plots



# Participating Institutions & Expressed Interest



	Hardware oriented	Software oriented
eRD6: BNL, INFN Trieste, Florida Tech. Stony Brook U., UVa, Temple U., UVa, Yale U.	<b>Central Tracker (gaseous):</b> TPC with MPGD readout; Fast Signal Cylindrical $\mu$ RWELL Layer <b>End Cap Tracker (gaseous):</b> Planar MPGD (GEMs, $\mu$ RWells);	Central and End Cap Tracking (Gaseous)
eRD22: JLab, Temple U., UVa	<b>End Cap Tracker (gaseous):</b> GEM-based Transition Radiation Detector (GEM-TRD)	Central and End Cap Tracking (Gaseous)
CEA Saclay (France)	<b>Central Tracker (gaseous):</b> Cylindrical Micromegas <b>End Cap Tracker (gaseous):</b> Planar Micromegas	Central tracking
eRD18: University of Birmingham (UK)	<b>Vertex Tracker (silicon):</b> Si tracker – vertex (MAPS)	Central tracking
STFC-RAL (UK)	Si- tracker	X
LANL	<b>Central Tracker (silicon):</b> Monolithic Active Pixel Sensor (MAPS). <b>End Cap Tracker(silicon):</b> Forward-rapidity silicon (MAPS + other)	Central and End Cap Tracking
UC Berkeley / LBNL	<b>Central and Forward Tracker (silicon):</b> + optimization of barrel-forward layout with all-Si and hybrid (Si+TPC) tracker concepts	Central and End Cap Tracking
INFN Bari	<b>Central Silicon Tracker</b>	Central Si-tracker
BNL ASICs	Si-Tracker	X

**Currently 71 members joined YR-Tracking-WG**

**With an attendance of ~ 25 to 30 to the Weekly Meeting**

ELC Yellow Report Workshop @ Temple U. 03/19/2020



# Deliverable for this 1<sup>st</sup> YR Workshop @ Temple U.



## Email from Peter

- ❖ **Baseline detector concept:** I'd hoped we come away from Temple with a baseline detector concept from which optimization studies could start/continue. This could be BeAST imported into G4E/eJana and Fun4All. This would include an understanding of the baseline detector technologies (MAPS for the silicon and TPC+GEM readout (?) for the outer tracker). It would be great if interested simulation groups would volunteer effort to make this happen. This would be a good step forward.
- ❖ **Definition of the Magnet:** One thing to consider is that Fun4All simulations for s/ePHENIX are quite detailed. This is built around an existing small bore 1.5 T magnet, just as were BeAST simulations in EicROOT. Clearly, there will be a community pretty fixed on this geometry and field setting. For me, the biggest question is the magnet. Once that is defined, the envelope for everything else is defined. In the new magnet case, we should evaluate the potential advantages/disadvantages of running with a 3 T magnetic field.
- ❖ **Complementary Detector:** Finally, there is the complementary detector issue. I don't have a clear steer on this. It will be interesting to see what comes out of the discussion on complementary detectors.
- ❖ **Baseline Detector Technologies:** On the technology side, it would be good to come away with a clear understanding of the baseline technologies and the potential advantages/disadvantages of any alternative technologies and also their technology readiness level.



# Today's agenda



< Thu 19/03 >

Print

PDF


Full screen

Detailed view

Filter

14:00	<b>Introduction to YR-Tracking WG and activities</b>	<i>Peter Jones</i>
	Online	14:00 - 14:15
	<b>Survey of Silicon Detector Technologies</b>	<i>Laura Gonella</i>
	Online	14:15 - 14:30
15:00	<b>ITS3 Technology</b>	<i>Leo Greiner</i>
	Online	14:30 - 14:45
	<b>Survey of Gaseous Detector Technologies</b>	<i>Kondo Gnanvo</i>
	Online	14:45 - 14:55
16:00	<b>Report on eRD6 and eRD22 activities</b>	<i>Matt Posik</i>
	Online	14:55 - 15:15
	<b>Cylindrical Micromegas for the Central Tracking</b>	<i>Francesco Bossu</i>
	Online	15:15 - 15:25
17:00	<b>Drift Chambers and Straw Tubes for Central Tracking</b>	<i>Franco Grancagnolo</i>
	Online	15:25 - 15:45
	<b>sTGCs for the End Cap Tracking</b>	<i>Daniel Brandenburg</i>
	Online	15:45 - 16:00

16:00

17:00	<b>Introduction to YR-Tracking WG Simulation</b>	<i>Domenico Elia</i>
	Online	16:30 - 16:45
	<b>Overview of Tracking Simulation needs and Plans</b>	<i>Barbara Jacak</i>
	Online	16:45 - 17:15
18:00	<b>Including detector services in simulations</b>	<i>Leo Greiner</i> 
	Online	17:15 - 17:30
	<b>Open Discussion</b>	<i>All</i>
	Online	17:30 - 18:00

18:00

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<https://indico.bnl.gov/event/7449/sessions/3672/attachments/27103/41316/go>



# Useful links for YR-Tracking-WG



- ❖ **Mailing list:** Currently 71 members  
[eicug-yr-detector-tracking@eicug.org](mailto:eicug-yr-detector-tracking@eicug.org)
  
- ❖ **Google groups:** Currently 71 members  
<https://groups.google.com/a/eicug.org/forum/?hl=en#!forum/eicug-yr-detector-tracking>
  
- ❖ **Weekly Meeting:** Every Thursday @ 12pm EDT (EST)
  - Indico page: <https://indico.bnl.gov/category/276/>
  - Bluejeans link: <https://bluejeans.com/215438302>
  
- ❖ **Electron-Ion Collider Detector Requirements and R&D Handbook**  
[http://eicug.org/web/sites/default/files/EIC\\_HANDBOOK\\_v1.1.pdf](http://eicug.org/web/sites/default/files/EIC_HANDBOOK_v1.1.pdf)