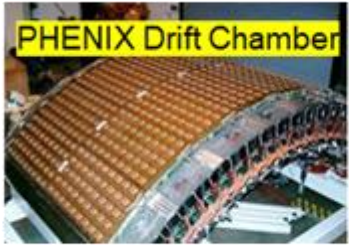
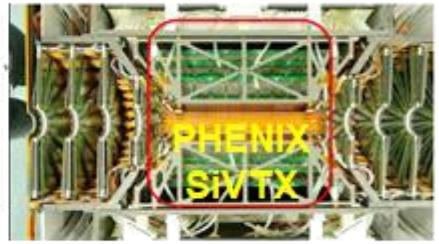
Stony Brook University

Center for Frontiers in Nuclear Science

Stony Brook University

10 Experimental Faculty, ~10 post docs, ~20 graduate students and ~20 undergraduate students **with strong history of contributions & collaborations: PHENIX**, **sPHENIX, SoLID, MOLLER, RHIC & JLab polarimetry & EIC Detector R&D program eRD2, eRD6, eRD14, eRD23 ...**





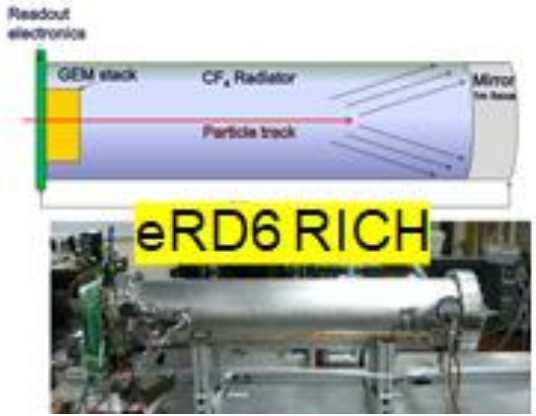
SBU EOI & Potential Collaboration Partners

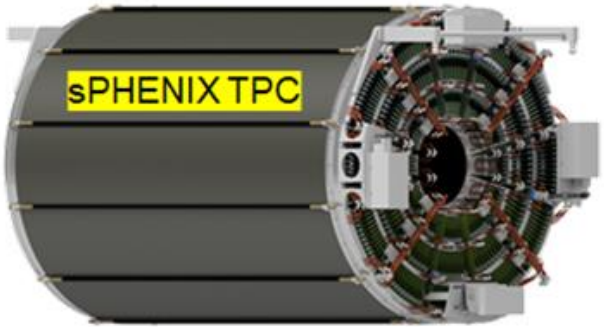
Particle identification with eRD6, eRD14 partners & collaborators

- Hadron Blind Detector for eID → SBU/WIS built HBD for PHENIX
- High-momentum reach RICH prototype, technology implemented in EIC simulation
- R&D Novel Cherenkov radiator material **with Indian inst.**
- dE/dx extension for sPHENIX TPC → EIC TPC
- LAPPD collaboration **with BNL**
- DIRC work in collaboration **with CUA and GSI**
- Co-convenor PID-WG YR

Tracking eRD6 partners & collaborators

- **Designing and building sPHENIX TPC** → EIC detector central tracker? **with Indian inst.**





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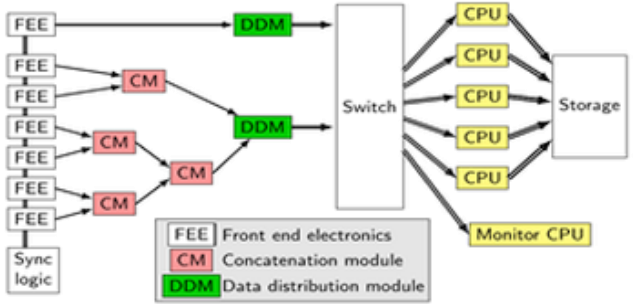
SBU EOI & Potential Collaborators

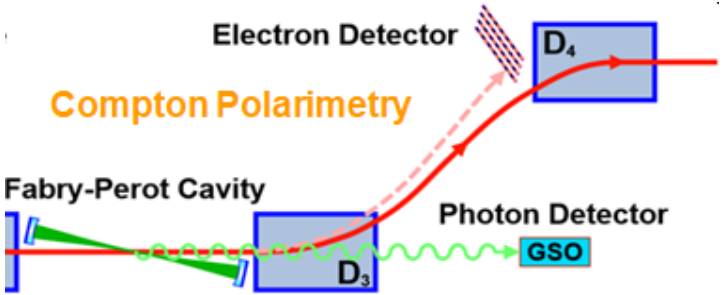
Data acquisition eRD23 (sPHENIX, SWG, RIKEN, MIT, BNL, JLab, ...)

- Streaming (trigger-less) readout development leadership



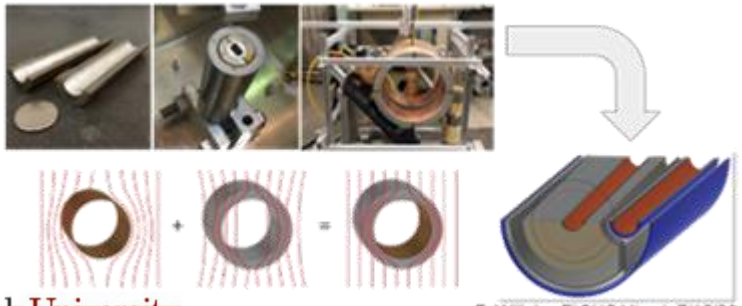
Polarimetry and forward calorimetry (BNL, JLab, UVa, UMass & RIKEN)

- **Proposing** laser (and detector system) for Compton polarimetry
- Development of **new techniques** for hadron polarimetry
- With RIKEN: design, develop and build Zero Degree Calorimetry



Magnetic cloak eRD2 (with BNL/Magnet/CAD, JLab)

- Use as shielding with forward dipole



The EoI Questionnaire

Page 1

Expression of Interest (EOI)
Questionnaire

(Use this template for your document. The document can be at most 10 pages long, in this style, font and font size, but you can have appendices and do not have to include the tables in the page count. There is no prescribed format of the document, but you are asked to address the questions below. This document will be viewable by password to all who submit. You can also submit a separate document with certain information you would only like to be viewable by the EIC Project. DEADLINE FOR SUBMISSION: NOVEMBER 1.)

Please indicate the name of the contact person for this submission:
(we ask for one main contact person per submission. You can as needed provide further contacts, but there should be one primary contact)

Please indicate all institutions collectively involved in this submission of interest:
(even if institutions can submit on their own, it is highly encouraged to form groups to work together within their country, their geographical region, or as a general consortium)

Please indicate the items of interest for potential equipment cooperation:
(indicate experimental equipment components, including those integrated in the interaction regions, each separately)

Please indicate what the level of potential contributions are for each item of interest:
(e.g. indicate if contributions are for full in-kind experimental equipment components – we have provided a rough direct cost estimate for many components in an appendix, if contributions are for partial in-kind experimental equipment components, if contributions are for in-kind labor contributions, etc.).

Please indicate what, if any, assumptions you made as coming from the EIC Project or the labs for your items of interest:
(e.g., indicate if you include engineering and design activities or assume those to come from the EIC Project, if you assume certain material costs to be covered by the EIC Project, if you rely on existing capabilities at the labs, etc. Try to be as inclusive as you can be.).

Please indicate the labor contribution for the EIC experimental equipment activities:
(e.g., for each cooperation and/or institution list the number of senior staff, the number of postdocs, and the number of graduate and undergraduate students that you plan to dedicate to the EIC experimental equipment activities. Similarly, please list the number of engineers, designers and technicians included in your potential cooperation).

The EoI Questionnaire

Page 2

The time commitment of members of the <INSTITUTION NAME> group in the EIC efforts described in this EoI is anticipated to be as follows:

Institution Name	Professor	Research Professor	Staff Scientist	Postdoc	Graduate Student	Undergrad. student	Engineer	Designer	Technician	Total Sum
Institution A	0.1	0.3		0.5	0.2		0.8	0.5	1.0	
	0.1			0.5	0.2					
					0.5					
										4.7
Institution B	0.1			0.3	0.2	0.2				
					0.2	0.2				
										1.1

NOTE: FTE in the above table represents the annual fractional full time equivalent (FTE).
NOTE: for a professor, full-time equivalent research time may be limited to 25% max, for a research professor (or a sabbatical) or a staff scientist limited to 50% max, for a postdoc maybe 100%, and for a grad. student perhaps 50% (on average). For an undergraduate student research time (on average) is limited to 20% max.

(Repeat this table for each institution, or include the information for the whole group/consortium together in one table as shown above. ***This reflects an annual average FTE estimate.*** *Please state below for how many years you estimate this average cooperation level to be valid.)*

It is anticipated that the collaborative effort of <INSTITUTION A> to cooperate on the EIC Project is to include (at an annual basis) 0.2 full-time equivalent FTEs of a professor, 0.3 FTE of a research professor, 1.0 FTE of a postdoctoral researcher, and 0.9 FTEs of Ph.D. students. The technical collaborative effort contributed is to include up to 0.8 FTE of a (mechanical or electronics) engineer, 0.5 FTE of a designer, and 1.0 FTE of a technician. We anticipate the duration of this collaborative effort to cooperate on the EIC Project to start at the <DESIGN/CONSTRUCTION> phase and to be for a period of <TWO/THREE/FOUR/FIVE> years.

Please indicate if there are timing constraints to your submission:
(e.g., indicate any known or anticipated timing profile assumed in your EOI. This can include anticipated time frames folding in constraints due to ongoing commitments, due to ongoing R&D and its anticipated completion date, etc.)

Please indicate any other information you feel will be helpful:
(e.g., this could be things like assembly and storage space at your institute, clean rooms and class, special skills or machine shops, or perhaps some pointers to past accomplishments – you can expand on those in an appendix. If you could make existing engineering, design or technician labor available to the EIC experimental equipment but would rely on funds coming from the EIC Project you can also list those here).

The EoI Questionnaire Response

Page 1

Expression of Interest (EOI)
Questionnaire

(Use this template for your document. The document can be at most 10 pages long, in this style, font and font size, but you can have appendices and do not have to include the tables in the page count. There is no prescribed format of the document, but you are asked to address the questions below. It is understood that maybe not all questions can be answered precisely, everybody is asked to fill the questions as good as currently possible. All submitted public Questionnaires will be viewable here (https://indico.bnl.gov/event/8552/). You can also submit a separate document with certain information you would only like to be viewable by the EIC Project. DEADLINE FOR SUBMISSION: NOVEMBER 1.)

Please indicate the name of the contact person for this submission:

Please indicate all institutions collectively involved in this submission of interest:
BNL, Catholic University of America (CUA), GSI/Germany, INFN/Italy, JLab, MIT, RIKEN/Japan, Univ. of Massachusetts Amherst (UMass), University of Virginia (UVa), Indian institutes

Please indicate the items of interest for potential equipment cooperation:
PID:

1. Hadron Blind Detector for eID
2. High momentum reach RICH - forward RICH
3. Time Projection Chamber – dE/dx extension for sPHENIX TPC
4. DIRC
5. LAPPD

Tracking

1. EIC detector central tracker – transition sPHENIX TPC

Polarimetry and forward calorimetry

1. Compton polarimetry – laser
2. Hadron polarimetry
3. ZDC

Data acquisition

1. Streaming readout

IR integration

1. Beampipe magnetic shielding with forward dipole – magnetic cloak

The EoI Questionnaire Response

Page 2

Please indicate what the level of potential contributions are for each item of interest:
All contributions from SBU are for in-kind labor contributions and existing facilities provided in our laboratory. Collaborative institutes might provide partial in-kind experimental equipment components.

Please indicate what, if any, assumptions you made as coming from the EIC Project or the labs for your items of interest:
We assume design and engineering support from EIC project. Material and supply costs to be provided by EIC project.

Please indicate the labor contribution for the EIC experimental equipment activities:
Senior staff: 5 faculty, 5 research faculty, 6 post-docs, 10 graduate students, 15 undergraduate students

(e.g., for each cooperation and/or institution list the number of senior staff, the number of postdocs, and the number of graduate and undergraduate students that you plan to dedicate to the EIC experimental equipment activities. Similarly, please list the number of engineers, designers and technicians included in your potential cooperation).

The time commitment of members of the SBU group in the EIC efforts described in this EoI is anticipated to be as follows:

Institution Name	Professor	Research Professor	Postdoc	Graduate Students	Undergrad. students	Total Sum
SBU	0.1	0.4	0.5	5.0	3.0	
	0.15	0.5	0.5			
	0.25	0.5	0.5			
	0.25	0.5	0.5			
	0.25	0.5	0.5			
			0.5			14.4

NOTE: FTE in the above table represents the annual fractional full time equivalent (FTE).
NOTE: for a professor, full-time equivalent research time may be limited to 25% max, for a research professor (or a sabbatical) or a staff scientist limited to 50% max, for a postdoc maybe 100%, and for a grad. student perhaps 50% (on average). For an undergraduate student research time (on average) is limited to 20% max.

(Repeat this table for each institution or include the information for the whole group/consortium together in one table as shown above. ***This reflects an annual average FTE estimate.*** *Please state below for how many years you estimate this average cooperation level to be valid.)* ***?????***

The EoI Questionnaire Response

Page 3

It is anticipated that the collaborative effort of SBU to cooperate on the EIC Project is to include (at an annual basis) 1.0 full-time equivalent FTEs of a professor, 2.4 FTE of a research professor, 3.0 FTE of a postdoctoral researcher, 5.0 FTEs of graduate students, and 3.0 FTEs of undergraduate students. We anticipate the duration of this collaborative effort to cooperate on the EIC Project to start at the design phase and to be for a period of five years.

Please indicate if there are timing constraints to your submission:
(e.g., indicate any known or anticipated timing profile assumed in your EOI. This can include anticipated time frames folding in constraints due to ongoing commitments, due to ongoing R&D and its anticipated completion date, etc.) ***?????***

Please indicate any other information you feel will be helpful:
Large laboratory space. Large cleanroom (class 1000), well equipped machine shop. Machine shop work to be funded by EIC funds.
SBU has and had leading contributions to sPHENIX, SoLID, MOLLER, RHIC and JLab polarimetry, various EIC detector R&D program groups, PHENIX.
sPHENIX: TPC
SoLID: HGC/LGC
MOLLER: GEM tracker
eRD2/6/14/23/polarimetry
PHENIX: RICH, Drift Chamber, HBD, SiVTX

The EoI Questionnaire & IP8

"…plan is to set up an editorial board of a few people, drawn from inside and outside the RHIC community, to coordinate further discussion and the development of an EoI document describing the possible contributions to EIC detector development by the various institutions, the connections to related efforts, and the value of the IP8 infrastructure to the EIC program."

sPHENIX General Meeting Aug. 21