



# Overview

## EIC Project / EIC Users' group and National Academy of Sciences review status



Bernd Surrow



On behalf of the EIC UG Steering Committee



# Welcome

- Welcome to the [EICUG meeting 2017](#) on behalf of the EIC Users' group Steering Committee



- Special Thanks to Silvia Dalla Torre and Andrea Bressan for hosting the Users' meeting this summer in Trieste
- [Special welcome to funding agency and community representatives in the EU and US:](#)
  - [Tim Hallman](#): DOE NP Perspective on a Possible Future Election Ion Collider
  - [Angela Bracco](#): The 2017 NuPECC Long-Range Plan
  - [Barbara Erazmus](#): EU Integrating Activity in Hadron Physics
  - [Patrice Verdier](#): The IN2P3 visions and plans for nuclear and particle physics
  - [Anne-Isabelle Etievre](#): The CEA/IRFU visions and plans for nuclear and particle physics
  - [Fernando Ferroni](#): The INFN vision and plans for nuclear and particle physics



# Outline



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- Overview of EIC Users' group (EICUG): Charter / Size / Demographics





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- Leadership teams:



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  - Steering Committee (SC)



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- Recent SC activities and short-term plans



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- Upcoming EIC related meetings



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- Upcoming EIC related meetings
- Review status by the [National Academies of Sciences, Engineering and Medicine \(NAS\)](#)
- Summary / Overview of EICUG discussion sessions



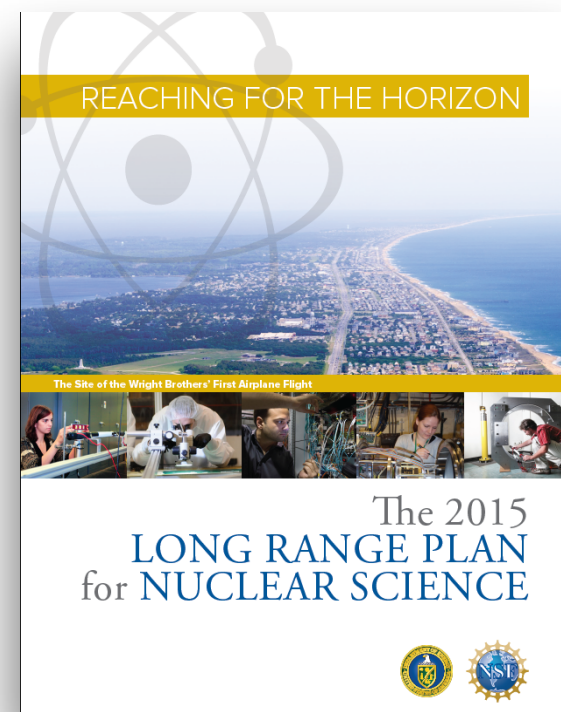


# Overview of EIC Users' group (EICUG)

## □ Charter (1)

### □ Preamble:

- Recommendation by the U.S. nuclear physics community in the 2015 Long Range Plan that an Electron-Ion Collider (EIC) is the highest priority for new facility construction.
- Timely for all the users of a future US-based EIC to organize more formally into an EIC Users Group (EICUG) with the goal of giving the future users community a stronger and more visible role in the process leading to the realization of an EIC.





# Overview of EIC Users' group (EICUG)

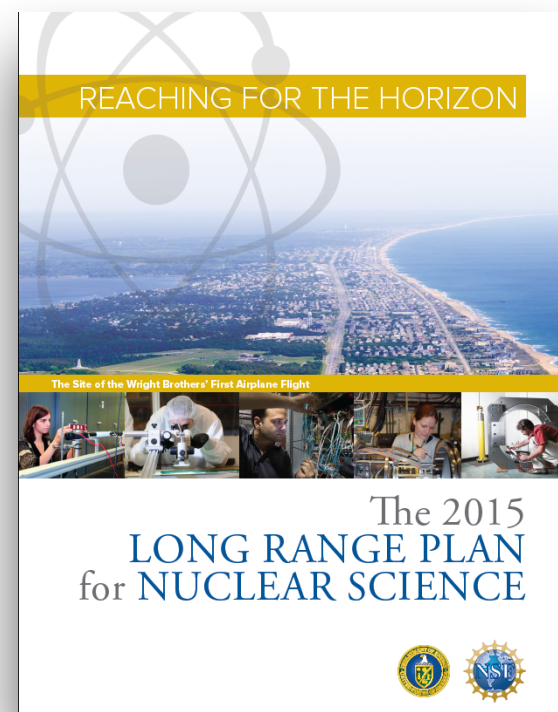
## □ Charter (2)

### □ Preamble:

#### □ Anticipated phases of the EIC project: (US DOE

Critical Decision (CD) steps)

- Phase 1: The period to the EIC CDO
  - Phase 2: From CDO to CD1
  - Phase 3: From CD1 to CD4, end of construction
  - Phase 4: EIC operation
- Expect that real experiment collaborations would form during phases 2-3.





# Overview of EIC Users' group (EICUG)

## □ Charter (3)

### □ Mission:

- In Phase 1, the EICUG is primarily the means by which future international users and scientists supporting the EIC case can engage collectively to enhance progress towards the realization of the EIC and its science. The EICUG will work to
  - Enhance and refine the science case beyond that contained in the EIC White Paper written for the 2015 US Nuclear Physics Long Range Plan
  - Provide a forum for discussion and promote collaboration across the accelerator, experimental and theoretical communities to enhance progress towards the realization of the EIC
  - Represent the interests of EIC users in discussions with the laboratories and funding agencies

- Membership: Membership is open from all institutions that support the mission of the EIC project. Each institution will designate a representative to sit on the EICUG Institutional Board (IB).



# Overview of EIC Users' group

## □ Size and demographics (1)

- EICUG organization established in summer 2016
- In numbers....: **697 members** (382: Experimentalists / 126: Theorists / Accelerator Scientists: 146 / Other: 43), 160 institutions, 29 countries
- World map:

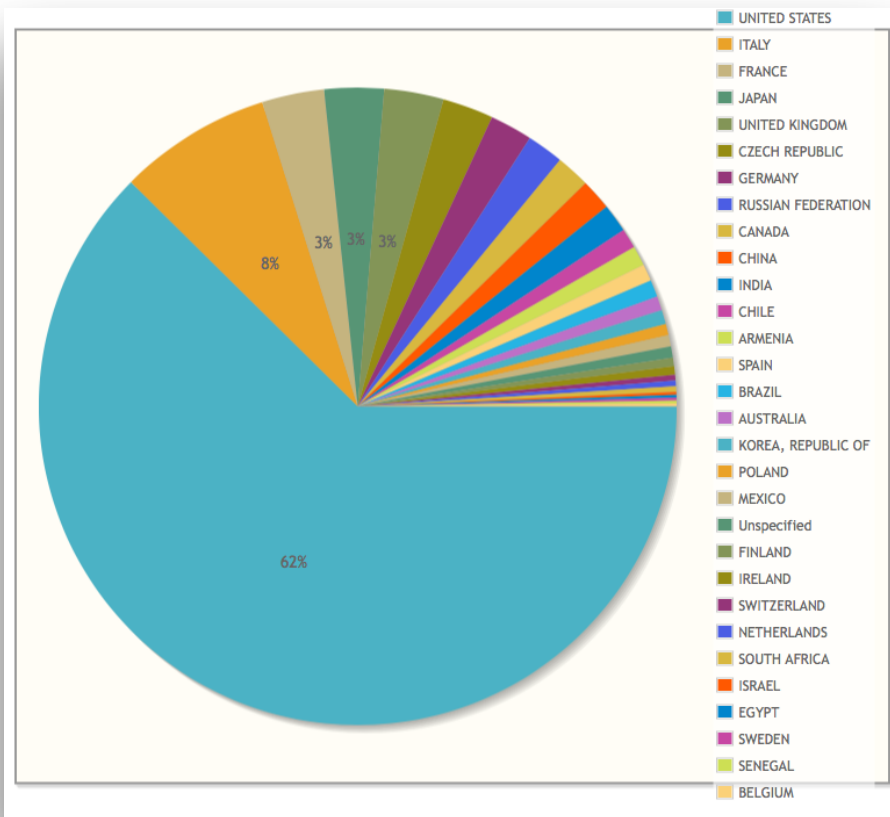




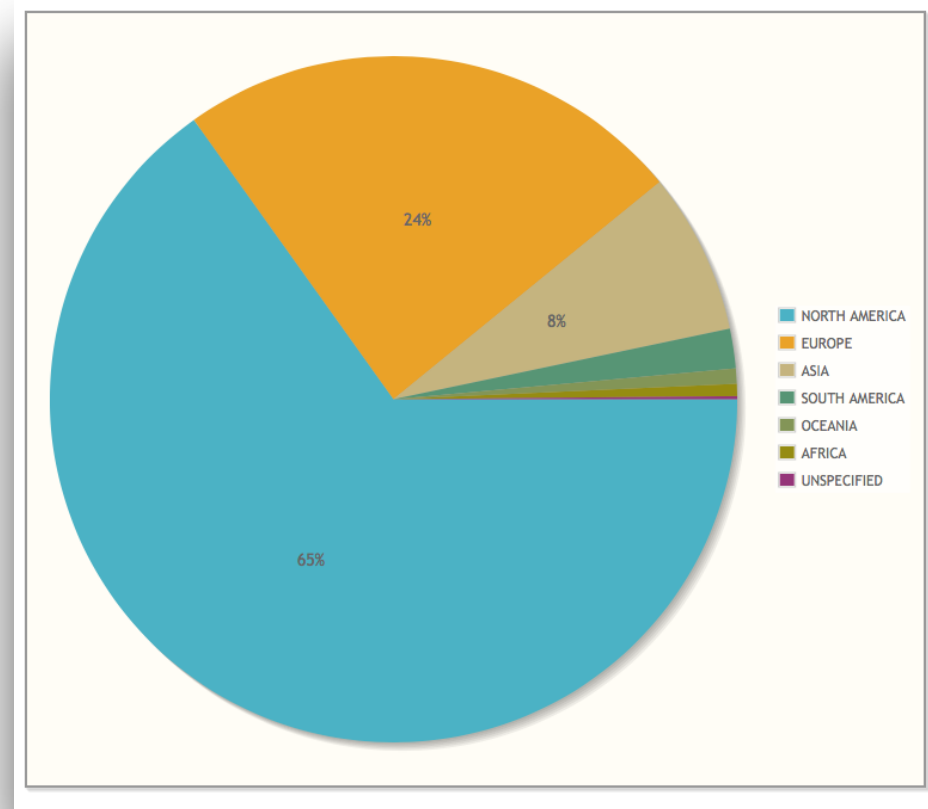
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## Size and demographics (2)

### Members by Country:



### Members by Region:

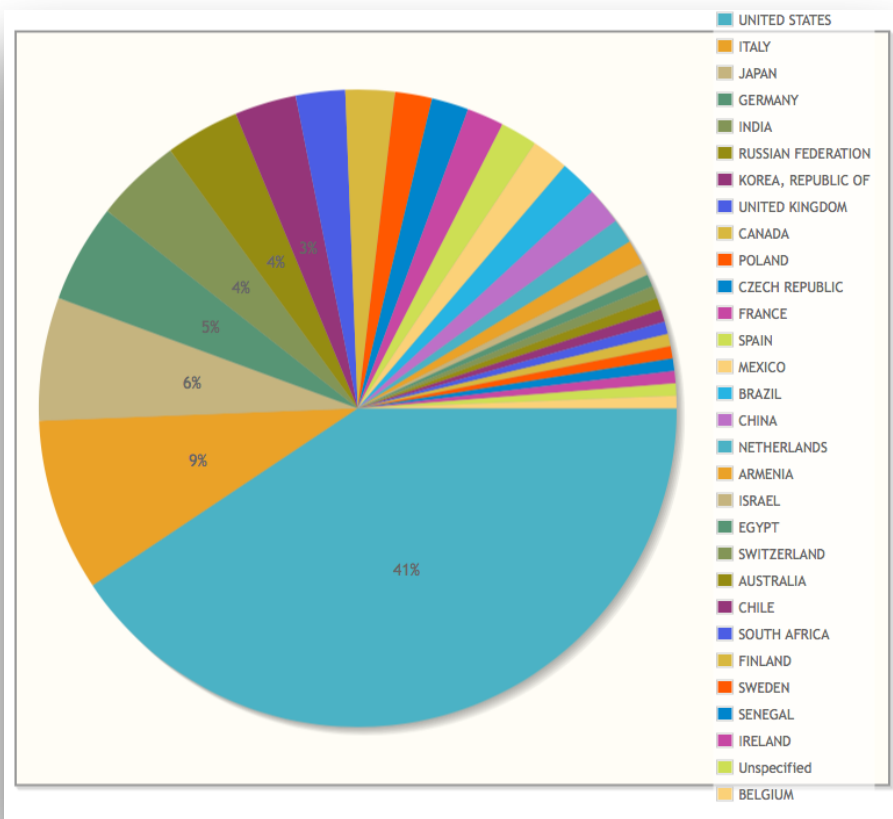




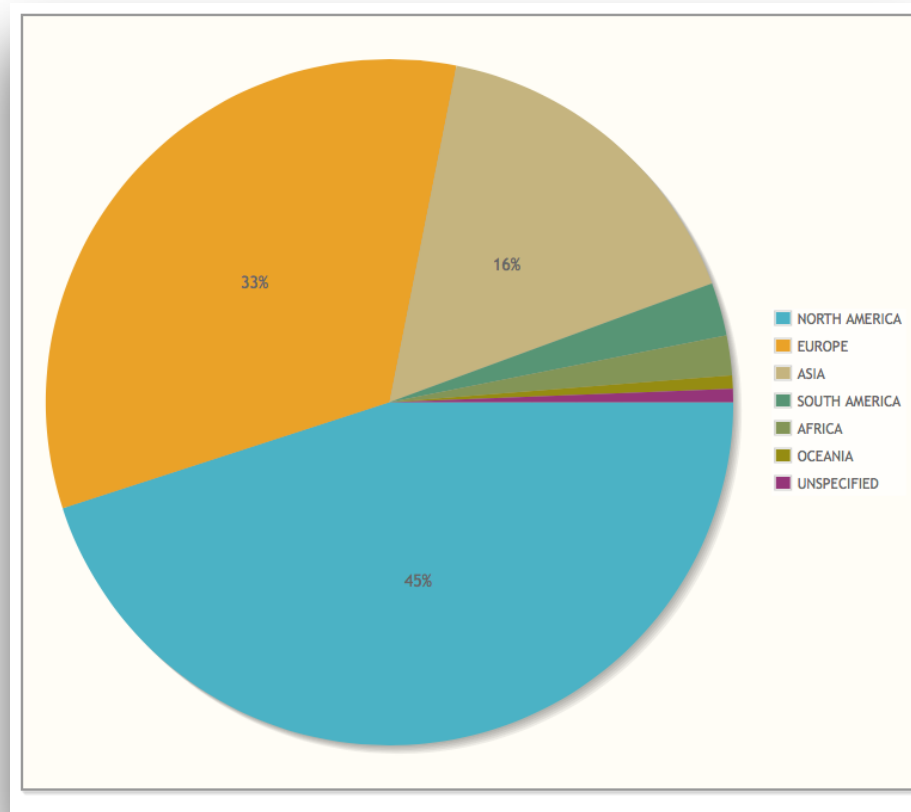
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## Size and demographics (3)

### Institutions by Country:



### Institutions by Region:





# Leadership Teams

- Steering Committee (SC): 1
  - Vice Chair / Chair:
    - Past chair: Abhay Deshpande
    - Past vice chair / Current acting chair: B. Surrow
    - New chair elections ongoing / Expect announcement of election results on Saturday, July 22
  - Three regular members:
    - John Arrington
    - Charles Hyde
    - Marco Radici



# Leadership Teams

- Steering Committee (SC): 2
  - Two selected by laboratories (BNL / JLab):
    - BNL: Thomas Ullrich
    - JLab: Rikutarō Yoshida
- Representative of regional institutions:
  - Europe: Daniel Boer
  - Initiate "International representative" of member countries not represented by US and Europe / Presented to IB board this week and subject for IB board approval



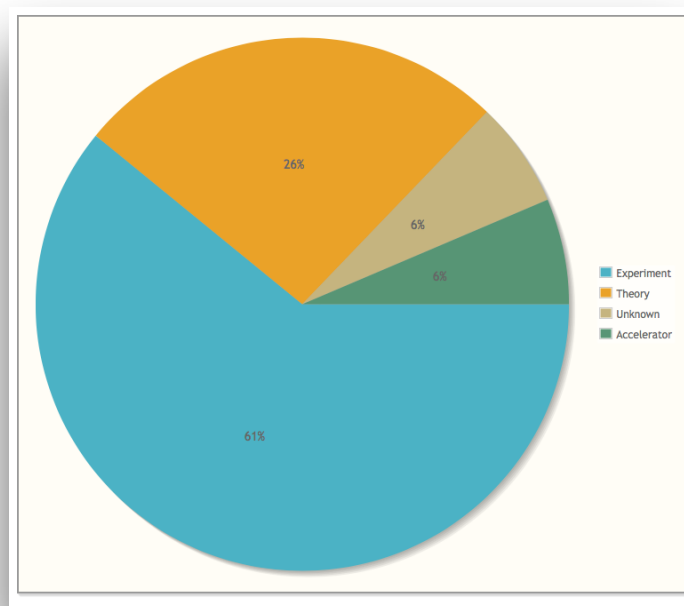


# Leadership Teams

## □ Election & Nomination Committee (E&N): 5 members drawn from entire EICUG

- Kawtar Hafidi
- Paul Newman
- Richard Milner (Chair)
- Raju Venugopalan
- Christian Weiss

## □ Institutional Board (IB): Chair: Christine Aidala





## Recent SC activities and short-term plans

- Bi-weekly Steering committee meetings, Monday, 12:00PM (min. 1h)
- Recent activities include:
  - Establish Election & Nomination (E&N) committee following charter
  - Complete steering committee (Ongoing chair elections carried out by E&N committee)
  - Initiate "International representative" position to be presented to IB board and approved by IB board
  - Prepare answers to NAS review questions
  - Prepare and discuss agenda for Users' meeting / Discussion sessions
  - Communication to funding agencies and BNL / JLab management
- Short-term plans:
  - Initiate outreach task force incl. update of online platform (WWW Front portal / Document data base)
  - Update of Whitepaper / Working group formation (See: Thursday afternoon discussion!)



# EIC R&D program

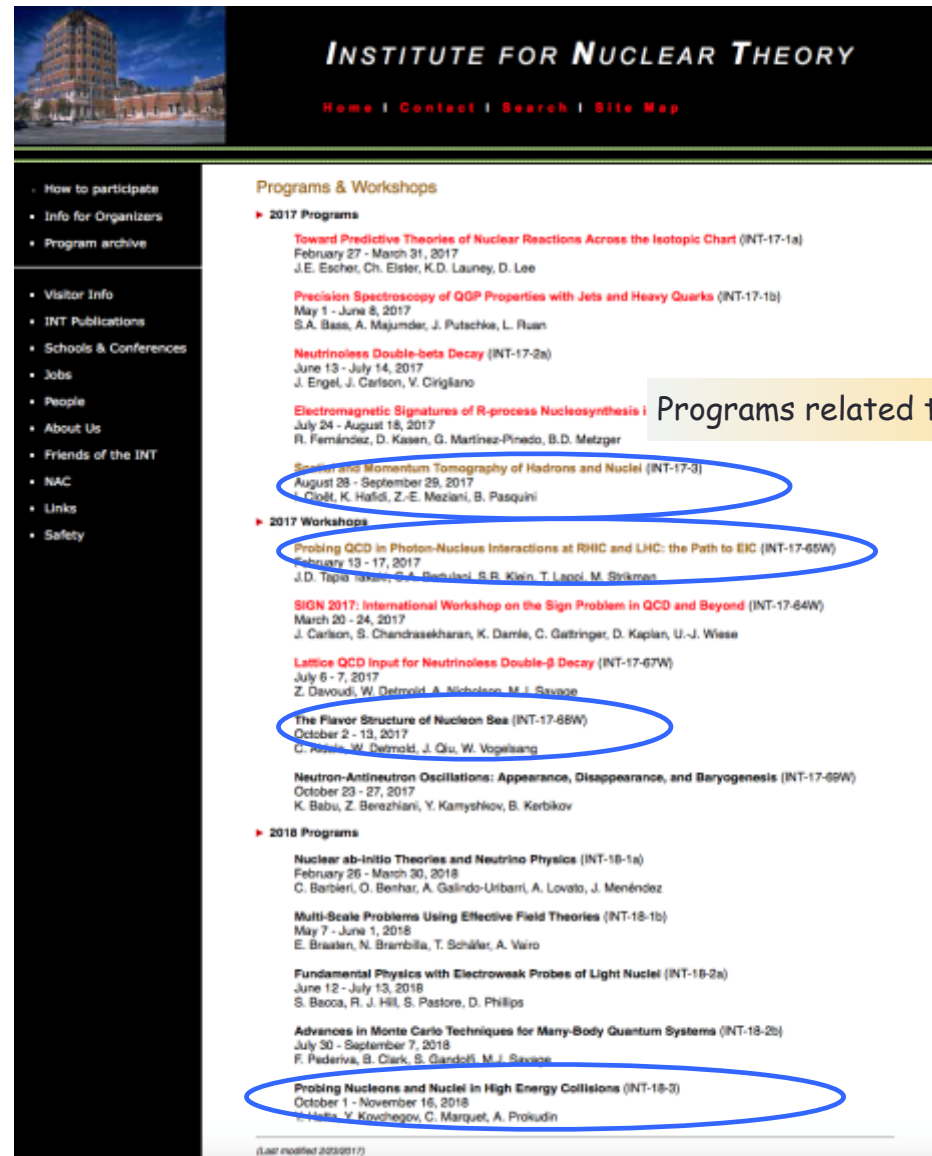
## □ Generic Detector R&D program for an EIC

- In January 2011, BNL, in association with JLab and the DOE Office of NP, announced a generic detector R&D program to address the scientific requirements for measurements at a future EIC facility.
- Goals:
  - Enable successful design and timely implementation of an EIC experimental program
  - Develop instrumentation solutions that meet realistic cost expectations
  - Stimulate the formation of user collaborations to design and build experiments
- Peer-reviewed program funded by DOE and managed by BNL with \$1M/year to \$1.5M/year  
Initiated and coordinated by Tom Ludlam (BNL) until 2014 / Since 2014 coordinated by Thomas Ullrich (BNL)
- Key to success: Standing EIC Detector Advisory Committee
  - Current members: Marcel Demarteau (ANL), Carl Haber (LBNL), Peter Krizan (Ljubljana), Ian Shipsey (Oxford), Rick van Berg (UPenn), Jerry Va'vra (SLAC) and Glenn Young (JLab)
  - Past members: Robert Klanner (Hamburg) and Howard Wieman (LBL)



# EIC related meetings

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### Programs & Workshops

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Programs related to EIC

# EIC related meetings



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Programs related to EIC





# EIC related meetings



**The Proton Mass**  
At the heart of most visible matter.  
Temple University, March 28-29, 2016

**Speakers**

- Sam Brodsky (SLAC)
- Xiaobang Ji (Maryland)
- Dima Khavarozy (Brookhaven & BNL)
- Kate Pui Lin (University of Kentucky)
- David Richards (JLab)
- Craig Roberts (ANL)
- Martin Senger (University of Washington)
- Stephen Soper (JLab)
- George Sorensen (Brookhaven)

**Moderator**

Alfred Mueller (Colorado)

**Local Organizers**

Zain Eddine Moukt (Temple U.)  
Jiamin Qiu (Brookhaven National Lab)

**Workshop Topics**

- Hadron Mass Calculation
- Lattice QCD and Other Methods
- Hadron Mass Decomposition

**Equations:**

$$M_p = 2m_u + m_d + m_q$$

$$H_{QCD} = H_G + H_m + H_A + H_S$$

**Quark kinetic and potential energy:**

$$H_G = \int d^3x (\vec{E}^2 + \vec{B}^2) / 2$$

**Quark mass:**

$$H_m = \int d^3x \bar{\psi} \psi$$

**Gluon kinetic and potential energy:**

$$H_A = \int d^3x (\vec{E}^2 + \vec{B}^2) / 2$$

**Three-body:**

$$H_S = \int d^3x \bar{\psi} \gamma_5 \psi (\vec{E}^2 + \vec{B}^2) / 2$$


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Programs related to EIC



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**POETIC VI**  
6th International Conference on  
Physics Opportunities at an Electron-Ion Collider  
7-11 September 2015  
École Polytechnique, Palaiseau, France  
<http://poetic6.sciencesconf.org/>

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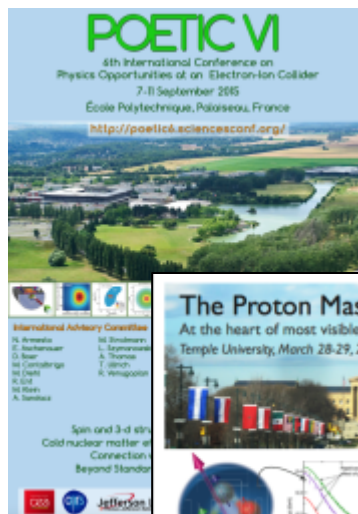
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École Polytechnique, Palaiseau, France  
<http://poetic6.sciencesconf.org/>

**PHYSICS**  
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**Programs & Workshops**  
► 2017 Programs

**Toward Predictive Theories of Nuclear Reactions Across the Isotopic Chart (INT-17-1a)**  
March 31, 2017  
H. Elster, K.D. Launey, D. Lee

**Spectroscopy of QGP Properties with Jets and Heavy Quarks (INT-17-1b)**  
March 31, 2017  
Majumder, J. Putschke, L. Ruan

**Double-beta Decay (INT-17-2a)**  
March 14, 2017  
Rison, V. Cirigliano

**Relativistic Signatures of R-process Nucleosynthesis in Neutron Star Mergers (INT-17-2b)**  
March 14, 2017  
D. Kasen, G. Martínez-Pinedo, B.D. Metzger

**Spin and Momentum Tomography of Hadrons and Nuclei (INT-17-3)**  
August 28 - September 29, 2017  
L. Cloët, K. Hafidi, Z.-E. Meziani, B. Pasquini

► 2017 Workshops

**Probing QCD in Photon-Nucleus Interactions at RHIC and LHC: the Path to EIC (INT-17-65W)**  
February 13 - 17, 2017  
J.D. Tapia-Salazar, S.A. Bouchie, S.B. Klein, T. Lappi, M. Styrud

**SIGN 2017: International Workshop on the Sign Problem in QCD and Beyond (INT-17-64W)**  
March 20 - 24, 2017  
J. Carlson, S. Chandrasekharan, K. Damle, C. Gattringer, D. Kaplan, U.-J. Wiese

**Lattice QCD Input for Neutrinoless Double-β Decay (INT-17-67W)**  
July 6 - 7, 2017  
Z. Davoudi, W. Detmold, A. Nicholson, M.J. Savage

**The Flavor Structure of Nucleon Sea (INT-17-68W)**  
October 2 - 13, 2017  
C. Paschos, W. Detmold, J. Qiu, W. Vogelsang

**Neutron-Antineutron Oscillations: Appearance, Disappearance, and Baryogenesis (INT-17-69W)**  
October 23 - 27, 2017  
K. Babu, Z. Berezhiani, Y. Kamyskov, B. Kerbikov

► 2018 Programs

**Nuclear ab-initio Theories and Neutrino Physics (INT-18-1a)**  
February 26 - March 30, 2018  
C. Barbieri, O. Benhar, A. Galindo-Uribarri, A. Lovato, J. Menéndez

**Multi-Scale Problems Using Effective Field Theories (INT-18-1b)**  
May 7 - June 1, 2018  
E. Braaten, N. Brambilla, T. Schäfer, A. Vairo

**Fundamental Physics with Electroweak Probes of Light Nuclei (INT-18-2a)**  
June 12 - July 13, 2018  
S. Bacca, R. J. Hill, S. Pastore, D. Phillips

**Advances in Monte Carlo Techniques for Many-Body Quantum Systems (INT-18-2b)**  
July 30 - September 7, 2018  
F. Pederiva, B. Clark, S. Gandolfi, M.J. Savage

**Probing Nucleons and Nuclei in High Energy Collisions (INT-18-3)**  
October 1 - November 16, 2018  
M. Hufner, Y. Kovchegov, C. Marquet, A. Prokudin

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**The Proton Mass**  
At the heart of most visible matter.  
Temple University, March 28-29, 2016

**Joint CTEQ Meeting and POETIC VI**  
(7th International Conference on Physics Opportunities at an Electron-Ion Collider)  
Temple University  
November 14-18, 2016

**EICUG MEETING – July 18-22 TRIESTE 2017**  
Hosting Institution: INFN, Sezione di Trieste  
in cooperation with Trieste University

Programs related to EIC

# EIC related meetings

**POETIC VI**  
4th International Conference on  
Physics Opportunities at an Electron-Ion Collider  
7-11 September 2015  
École Polytechnique, Palaiseau, France  
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EIC Workshop  
July 8 2016

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**Highly Active EIC Community has evolved**

Hosting Institution: INFN, Sezione di Trieste  
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(Last modified 20230517)



## EIC related meetings

### □ Upcoming INT Workshop series:

- Spatial and Momentum Tomography of Hadrons and Nuclei (INT-17-3), August 28, 2017 - September 29, 2017 (I. Cloet, K. Hafidi, Z.-E. Meziani, B. Pasquini)
- The Flavor Structure of Nucleon Sea (INT-17-68W), October 2-13, 2017 (C. Aidala, W. Detmold, J. Qiu, W. Vogelsang)
- Probing Nucleons and Nuclei in High Energy Collisions (INT-18-3), October 1, 2018 - November 18, 2018 (Y. Hatta, Y. Kovchegov, C. Marquet, A. Prokudin)



## EIC related meetings

- 6th International Workshop on Deep-Inelastic Scattering and Related Topics (**DIS**

**2018**), Kobe, Japan, April 16-20, 2018

- Physics Opportunities at an ElecTron-Ion Collider (**POETIC 2018**) conference,

Regensburg, Germany, March 19-22, 2018

- **EICUG meeting 2018** - Summer 2018 / Two suggestions so far - Announcement on Sat.!



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## □ Overview (1)

<http://www.nationalacademies.org>



# Nat. Academy of Sciences, Engineering & Medicine

## □ Overview (1)

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The **National Academy of Sciences**: Established in 1863 by an Act of Congress, signed by President Lincoln, as a private, non-governmental institution to **advise** the **nation on issues related to science and technology**.





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The **National Academy of Engineering**: Established in 1964 under the charter of the **National Academy of Sciences** to **advise** nation on engineering matters.



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The **National Academy of Engineering**: Established in 1964 under the charter of the **National Academy of Sciences** to **advise nation on engineering matters**.

The **National Academy of Medicine** (Formerly the Institute of Medicine): **Established in 1970 under the charter of the National Academy of Sciences** to **advise nation on medical and health issues**.



# Nat. Academy of Sciences, Engineering & Medicine

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# Nat. Academy of Sciences, Engineering & Medicine

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Three Academies work together as the National Academies of Sciences, Engineering, and Medicine:



# Nat. Academy of Sciences, Engineering & Medicine

## □ Overview (2)

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Three Academies work together as the National Academies of Sciences, Engineering, and Medicine:

- Provide independent, objective analysis and advice to the nation / Conduct other activities to solve complex problems and inform public policy decisions.
- The National Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine.



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**NEW REPORT**  
Value of Social, Behavioral, and Economic Sciences to National Priorities

**NEW REPORT**  
Revisiting Brucellosis in the Greater Yellowstone Area

**NEW REPORT**  
Actions Needed to Strengthen U.S. Skilled Technical Workforce

**NEW REPORT**  
Achieving Global Health Security

May 15 - A new National Academies [report](#) identifies global health priorities and makes 14 recommendations to address current and emerging health challenges, while maintaining U.S. status as a world leader in global health.

Visiting Our Two DC Locations

NAS Building  
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Keck Center  
500 Fifth St NW

Winners of Design Competition Announced

The Airport Cooperative Research Program, managed by the Academies' Transportation Research Board, recently announced winners for its University Design Competition for Addressing Airport Needs. The competition encourages students to design innovative and practical solutions to challenges faced by our nation's airports. Students were invited to propose innovations in four technical challenge areas: Airport Operation and Maintenance, Runway Safety/Runway Incursions/Runway Excursions, Airport Environmental Interactions, and Airport Management and Planning. [Read More](#)

\$1.55 Million Awarded for 21 Research Projects

The National Academies Keck Futures Initiative and the Gulf Research Program are pleased to [announce](#) recipients of 21 interdisciplinary seed grants, totaling \$1.55 million. These competitive grants support collaborations and investigations resulting from the 14th annual [Futures conference](#).

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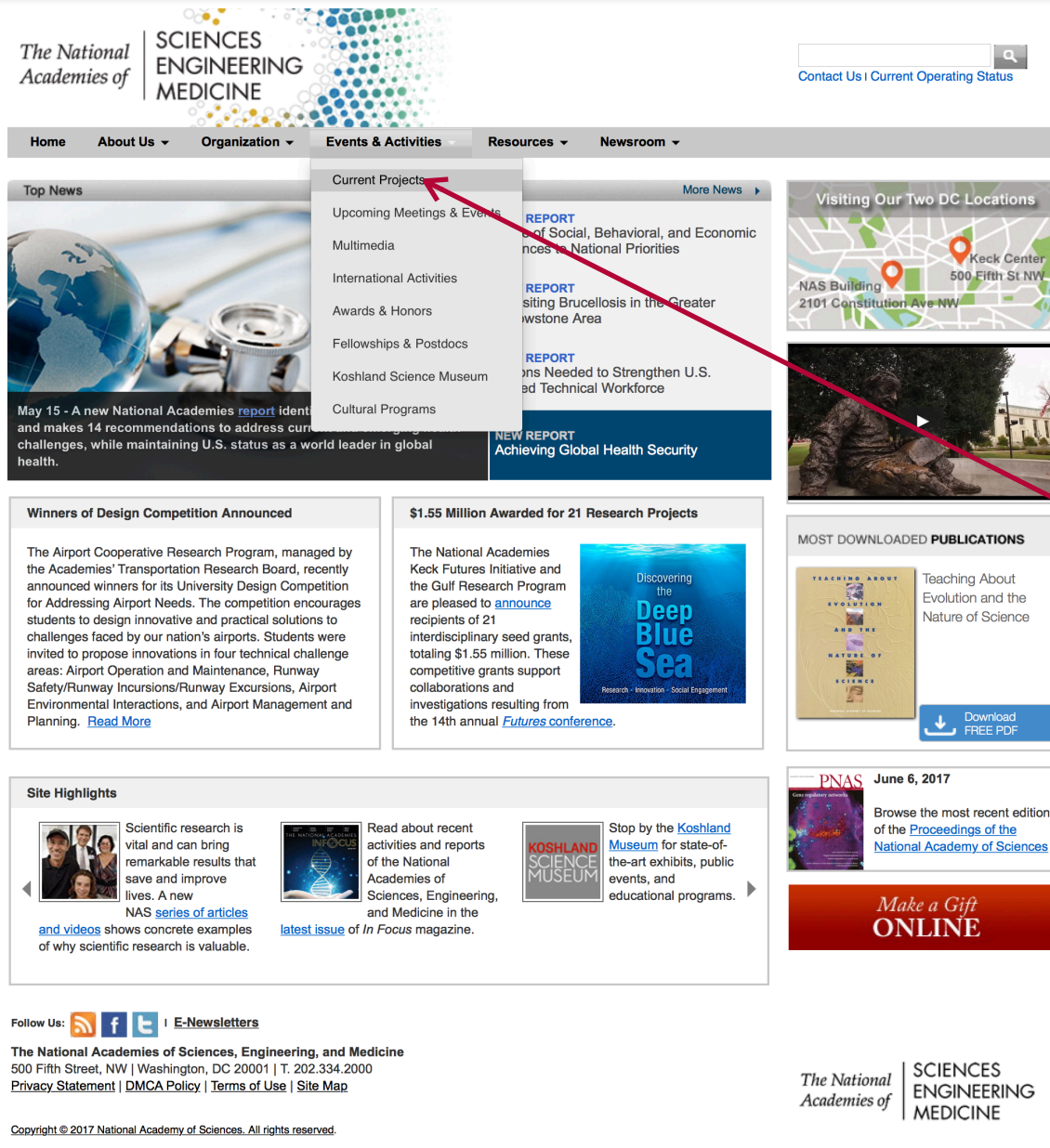
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- The Future of Atmospheric Chemistry Research
- U.S.-Based Electron Ion Collider Science Assessment
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- Army Research Laboratory Technical Assessment Board
- Army Research Laboratory Technical Assessment Board
- Assessing the Impacts of Climate Change on Social and Political Stresses
- Assessment of the Governance Structure of the NNSA National Security Laboratories
- Assuring a Future US-based Nuclear Chemistry Expertise
- Ballistic Missile Defense in the Context of Strategic Stability
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U.S.-Based Electron Ion  
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Project Information

Project Title:

U.S.-Based Electron Ion Collider Science Assessment

PIN:

DEPS-BPA-15-01

Major Unit:

Division on Engineering and Physical Sciences

Sub Unit:

Board on Physics & Astronomy DEPS

RSO:

Lancaster, James

Subject/Focus Area:

Math, Chemistry and Physics

Project Scope

The committee will assess the scientific justification for a U.S. domestic electron ion collider facility, taking into account current international plans and existing domestic facility infrastructure. In preparing its report, the committee will address the role that such a facility could play in the future of nuclear physics, considering the field broadly, but placing emphasis on its potential scientific impact on quantum chromodynamics.

In particular, the committee will address the following questions:

- What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?
- What are the capabilities of other facilities, existing and planned, domestic and abroad, to address the science opportunities afforded by an electron-ion collider? What unique scientific role could be played by a domestic electron ion collider facility that is complementary to existing and planned facilities at home and elsewhere?
- What are the benefits to U.S. leadership in nuclear physics if a domestic electron ion collider were constructed?
- What are the benefits to other fields of science and to society of establishing such a facility in the United States?

Project Duration:

18 months

Provide FEEDBACK on this project.

Contact the Public Access Records Office to make an inquiry, request a list of the public access file materials, or obtain a copy of the materials found in the file.

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Committee Membership

↳ Committee Membership

Meetings

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↳ Meeting 2 - 04/19/2017

Reports

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Project Information

Project Title:

U.S.-Based Electron Ion Collider Science Assessment

PIN:

DEPS-BPA-15-01

Major Unit:

Division on Engineering and Physical Sciences

Sub Unit:

Board on Physics & Astronomy DEPS

RSO:

Lancaster, James

Subject/Focus Area:

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- What are the capabilities of other facilities, existing and planned, domestic and abroad, to address the science opportunities afforded by an electron-ion collider? What unique scientific role could be played by a domestic electron ion collider facility that is complementary to existing and planned facilities at home and elsewhere?
- What are the benefits to U.S. leadership in nuclear physics if a domestic electron ion collider were constructed?
- What are the benefits to other fields of science and to society of establishing such a facility in the United States?

Project Duration:

18 months

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Committee Membership

↳ Committee Membership

Meetings

- ↳ Meeting 1 - 02/01/2017
- ↳ Meeting 2 - 04/19/2017

Reports

- Reports having no URL can be seen at the Public Access Records Office

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## Review status of the NAS

- NAS review charge and timeline (1)



## Review status of the NAS

### □ NAS review charge and timeline (1)

The committee will assess the **scientific justification for a U.S. domestic electron ion collider facility**, taking into account current international plans and existing domestic facility infrastructure. In preparing its report, the committee will address the **role that such a facility could play in the future of nuclear physics**, considering the field broadly, but placing emphasis on its **potential scientific impact on quantum chromodynamics**.

Duration: 18 months



## Review status of the NAS

- NAS review charge and timeline (2)



## Review status of the NAS

### □ NAS review charge and timeline (2)

**Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?



## Review status of the NAS

### □ NAS review charge and timeline (2)

**Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?

**Question 2:** What are the capabilities of other facilities, existing and planned, domestic and abroad, to address the science opportunities afforded by an electron-ion collider? What unique scientific role could be played by a domestic electron ion collider facility that is complementary to existing and planned facilities at home and elsewhere?



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**Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?

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**Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?

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**Question 3:** What are the benefits to U.S. leadership in nuclear physics if a domestic electron ion collider were constructed?

**Question 4:** What are the benefits to other fields of science and to society of establishing such a facility in the United States?





## Review status of the NAS

- NAS review committee (1)



## Review status of the NAS

### □ NAS review committee (1)

#### Dr. Ani Aprahamian (Co-Chair)

ANI APRAHAMIAN is a professor of experimental nuclear physics in the Department of Physics at the University of Notre Dame.

#### Dr. Gordon A. Baym (Co-Chair)

GORDON BAYM (NAS) is professor emeritus at the University of Illinois at Urbana-Champaign. Professor Baym is a member of the National Academy of Sciences (where he served as Chair of the Physics Section from 1995-1998)



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#### Dr. Christine Aidala

CHRISTINE AIDALA is an associate professor of physics at the University of Michigan.



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#### Dr. Christine Aidala

CHRISTINE AIDALA is an associate professor of physics at the University of Michigan.

#### Dr. Peter Braun-Munzinger

PETER BRAUN-MUNZINGER is the Scientific Director of the ExtreMe Matter Institute (EMMI) at GSI.



## Review status of the NAS

- NAS review committee (2)



## Review status of the NAS

### □ NAS review committee (2)

Dr. Haiyan Gao

HAIYAN GAO is a professor in physics and the Vice Chancellor for academic affairs at Duke University.



## Review status of the NAS

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#### Dr. Haiyan Gao

HAIYAN GAO is a professor in physics and the Vice Chancellor for academic affairs at Duke University.

#### Dr. Kawtar Hafidi

KAWTAR HAFIDI is the associate chief scientist for Laboratory Directed Research and Development at Argonne National Laboratory.



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#### Dr. John Jowett

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#### Dr. Larry McLerran

LARRY MCLERRAN is the Director of the Institute for Nuclear Theory at the University of Washington.



## Review status of the NAS

- NAS review committee (3)



## Review status of the NAS

### □ NAS review committee (3)

Dr. Zein-Eddine Meziani

ZEIN-EDDINE MEZIANI is a professor of physics at Temple University.



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#### Dr. Zein-Eddine Meziani

ZEIN-EDDINE MEZIANI is a professor of physics at Temple University.

#### Dr. Richard G. Milner

RICHARD MILNER is a professor of physics at MIT and director of MIT's Laboratory for Nuclear Science (LNS).



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#### Dr. Thomas Schaefer

THOMAS SCHAEFER is a professor of physics at North Carolina State University,



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ERNST SICHTERMANN is a senior scientist at Lawrence Berkeley National Laboratory.



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#### Dr. Michael S. Turner

MICHAEL TURNER (NAS) is the Bruce V. Rauner Distinguished Service Professor at University of Chicago and director of the PFC and the Kavli Institute for Cosmological Physics (KICP).





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#### Dr. Michael S. Turner

MICHAEL TURNER (NAS) is the Bruce V. Rauner Distinguished Service Professor at University of Chicago and director of the PFC and the Kavli Institute for Cosmological Physics (KICP).

#### Dr. Lia Merminga

LIA MERMINGA is the Associate Laboratory Director, Accelerator Directorate, at SLAC National Accelerator Laboratory, a position she has held since 2015.



# Review status of the NAS

## □ NAS review meetings I: February 1, 2017 - February 2, 2017, Washington, DC

### Open Session: Day 1 / February 1, 2017

Open Session:

11:30 European perspectives on an EIC facility, Peter Braun-Munzinger, GSI, Committee member

12:00 PM Lunch

1:00 The 2015 NSAC Long Range Plan, Donald Geesaman, Argonne National Lab

1:45 RHIC Cold QCD Plan for 2017 to 2023, Christine Aidala, U. Michigan, Committee Member

2:30 Discussion with Congressional staff, Adam Rosenberg, House Science & Technology Committee Energy Subcommittee

3:00 Break

3:15 Discussion with NSF Physics, Denise Caldwell, NSF PHY

4:00 Electron-Ion Collider: The next QCD frontier, Richard Milner, MIT, Committee Member

4:45 Discussion

5:00 Break



## Review status of the NAS

- NAS review meetings I: February 1, 2017 - February 2, 2017, Washington, DC

Open Session: Day 2. February 2, 2017

Open Session:

8:00 AM Breakfast available in meeting room

9:00 Discussion with DOE Nuclear Physics, Tim Hallman, DOE NP

10:00 Continued discussion with DOE

10:30 Break

11:00 Discussion with DOE Office of Science, Steve Binkley, DOE Office of Science

11:30 Continued discussion with DOE

12:00 PM Lunch



# Review status of the NAS

## □ NAS review meetings II: April 19, 2017 - April 20, 2017, Irvine, CA

### Open Session: Day 1 / April 19, 2017

10:00 Physics of gluon saturation

Jean-Paul Blaizot, IPhT CEA-Saclay

10:45 Break

11:00 Heavy ion physics at CERN

Peter Braun-Munzinger, GSI (committee member)

11:45 Lunch

12:45 Deep inelastic scattering

Amanda Cooper-Sarkar, Oxford University

1:30 Theoretical Perspectives on EIC Science

Xiangdong Ji, University of Maryland/Shanghai Jiao Tong University

2:15 Break

2:30 JLAB 5-year physics agenda

Zein-Eddine Meziani, Temple University (committee member)

3:15 Science potential of a U.S.-based EIC

Abhay Deshpande, Stony Brook University

4:00 Discussion

5:00 Break

### Open Session: Day 2. April 20, 2017

9:00 Discussion:

- Preliminary conclusions and recommendations
- Report outline
- Writing responsibilities
- Further information gathering

10:45 Break

11:00 Discussion, continued

12:00 PM Lunch

1:00 Discussion: future meetings, assignments, and schedule

2:00 Adjourn



## Review status of the NAS

- **Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?

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EICUG response



## Review status of the NAS

- **Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?
- An EIC facility will allow profound new insight into the dynamics and structure of matter emerging through fundamental interactions among quarks and gluons

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- **Questions 1:** What is the merit and significance of the science that could be addressed by an electron ion collider facility and what is its importance in the overall context of research in nuclear physics and the physical sciences in general?
- An EIC facility will allow profound new insight into the dynamics and structure of matter emerging through fundamental interactions among quarks and gluons
- An EIC facility is the required facility with versatile operation in terms of energy, polarization and luminosity to image quarks and gluons and explore strong color fields among quarks and gluons

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## Review status of the NAS

- **Question 2:** What are the capabilities of other facilities, existing and planned, domestic and abroad, to address the science opportunities afforded by an electron-ion collider? What unique scientific role could be played by a domestic electron ion collider facility that is complementary to existing and planned facilities at home and elsewhere?

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- **Large center-of-mass energy range:** Access to wide kinematic range overlapping various other experimental programs

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  - **Large center-of-mass energy range:** Access to wide kinematic range overlapping various other experimental programs
  - **Polarized electron and hadron beams:** Spin structure and 3D imaging

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- **Nuclear beams:** Access high gluon density region

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- **Large center-of-mass energy range:** Access to wide kinematic range overlapping various other experimental programs
- **Polarized electron and hadron beams:** Spin structure and 3D imaging
- **Nuclear beams:** Access high gluon density region
- **High luminosity:** Access to rare probes / Detailed studies of 3D imaging

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## Review status of the NAS

- **Question 3:** What are the **benefits to U.S. leadership in nuclear physics** if a domestic electron ion collider were constructed?

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## Review status of the NAS

- **Question 3:** What are the **benefits to U.S. leadership in nuclear physics** if a domestic electron ion collider were constructed?
- **Developing and building the accelerator infrastructure** will contribute to **leadership in accelerator technology**.

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## Review status of the NAS

- **Question 3:** What are the **benefits to U.S. leadership in nuclear physics** if a domestic electron ion collider were constructed?
  - Developing and building the **accelerator infrastructure** will contribute to **leadership in accelerator technology**.
  - Constructing the detectors to realize the **EIC science** will contribute to **leadership in detector technology**.

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## Review status of the NAS

- **Question 3:** What are the **benefits to U.S. leadership in nuclear physics** if a domestic electron ion collider were constructed?
  - Developing and building the **accelerator infrastructure** will contribute to **leadership in accelerator technology**.
  - Constructing the detectors to realize the **EIC science** will contribute to **leadership in detector technology**.
  - Developing the scope of the **science program** will contribute to **leadership in QCD theory**.

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  - Developing and building the accelerator infrastructure will contribute to leadership in accelerator technology.
  - Constructing the detectors to realize the EIC science will contribute to leadership in detector technology.
  - Developing the scope of the science program will contribute to leadership in QCD theory.
  - Bringing the expertise of an international users' group to the US will contribute to leadership and visibility as a hub of the nuclear physics community.

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  - Developing the scope of the science program will contribute to **leadership in QCD theory**.
  - Bringing the expertise of an **international users' group to the US** will contribute to **leadership and visibility as a hub of the nuclear physics community**.
  - Delivering on the science program of an **EIC** will lead to **landmark discoveries in nuclear physics**.

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## Review status of the NAS

- **Question 4:** What are the **benefits to other fields of science and to society** of establishing such a facility in the United States?

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## Review status of the NAS

- **Question 4:** What are the **benefits to other fields of science and to society** of establishing such a facility in the United States?
- **Education and Training:** Individuals going to other sectors benefitting society / Relevance for Medical Science / Ambassadorship of Nuclear Scientists

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  - **Education and Training:** Individuals going to other sectors benefitting society / Relevance for Medical Science / Ambassadorship of Nuclear Scientists
  - **Technology - Accelerator, detector, data science and data management:** Benefits to society outside of academic research and other fields of academic research

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  - **Science:** Scientific advances driven by the EIC will benefit other fields in science

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  - **Technology - Accelerator, detector, data science and data management:** Benefits to society outside of academic research and other fields of academic research
  - **Science:** Scientific advances driven by the EIC will benefit other fields in science
  - **Economic impact:** Increase in overall economic output based on economic studies at BNL and JLab

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# Summary / Overview of EICUG discussion sessions





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- **EICUG structure** almost in place initiated in summer 2018



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- **EIC project review** by the **National Academy of Sciences** is well under way which started early in 2017 by a high-profile committee



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- ❑ **Writing process** has started judging from 2nd meetings agenda
- ❑ **Additional input on Questions 2-4 has been submitted** to the co-chairs by the EIC Users' group
- ❑ **Next and 3rd NAS and meeting in September 2017 / Additional, Specific input requested concerning "EIC experiment computing and instrumentation and their possible impact on society"**



# Summary / Overview of EICUG discussion sessions



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- EICUG discussion sessions this week: Strongly encourage

active participation!



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Lots' of excitement  
about the EIC  
program:  
Accelerator, Physics  
(Experiment and  
Theory) and  
Instrumentation