The National Academies of | SCIENCES ENGINEERING MEDICINE

Decadal Assessment on the Physics of Living Systems

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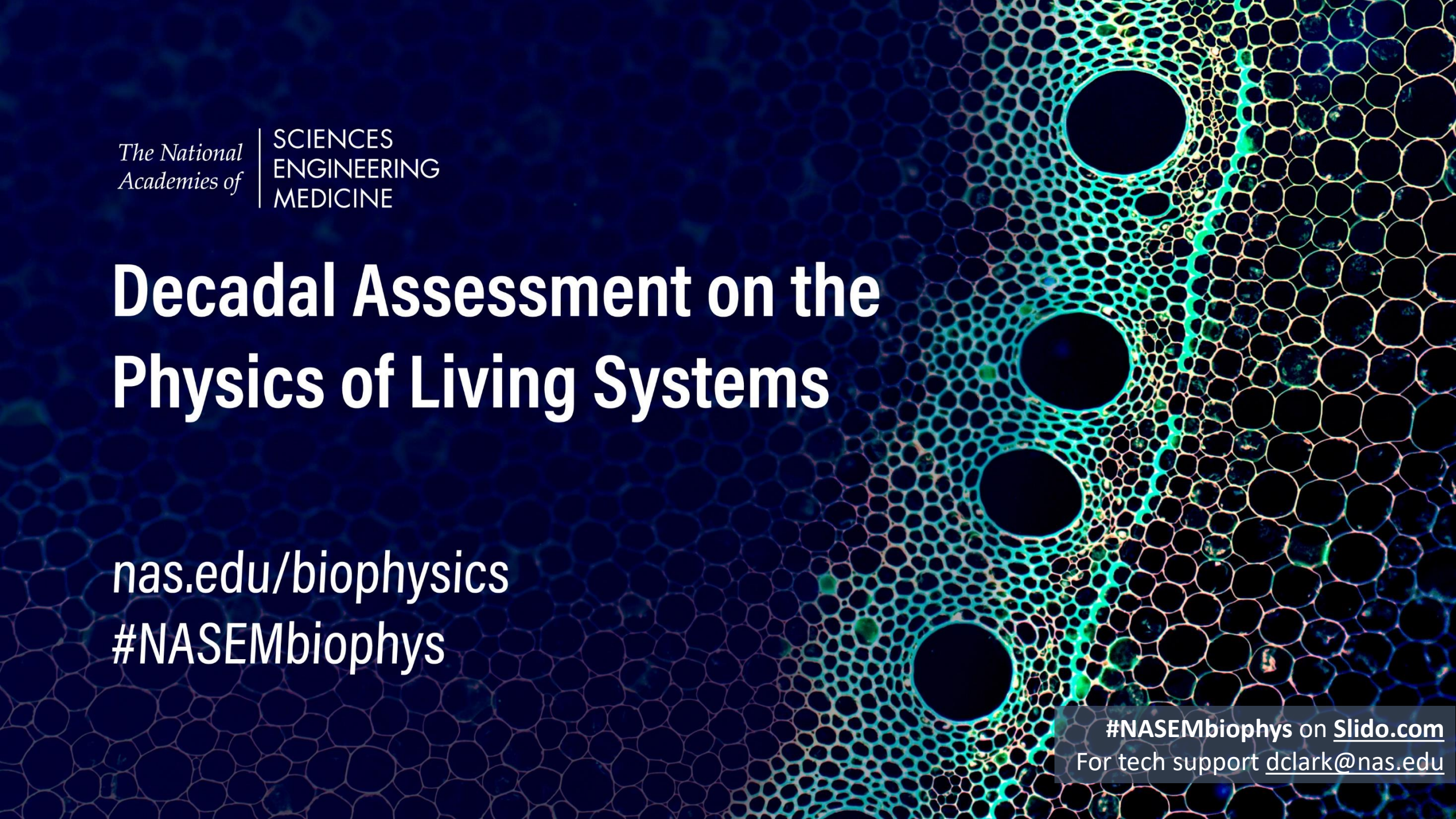
#NASEMbiophys



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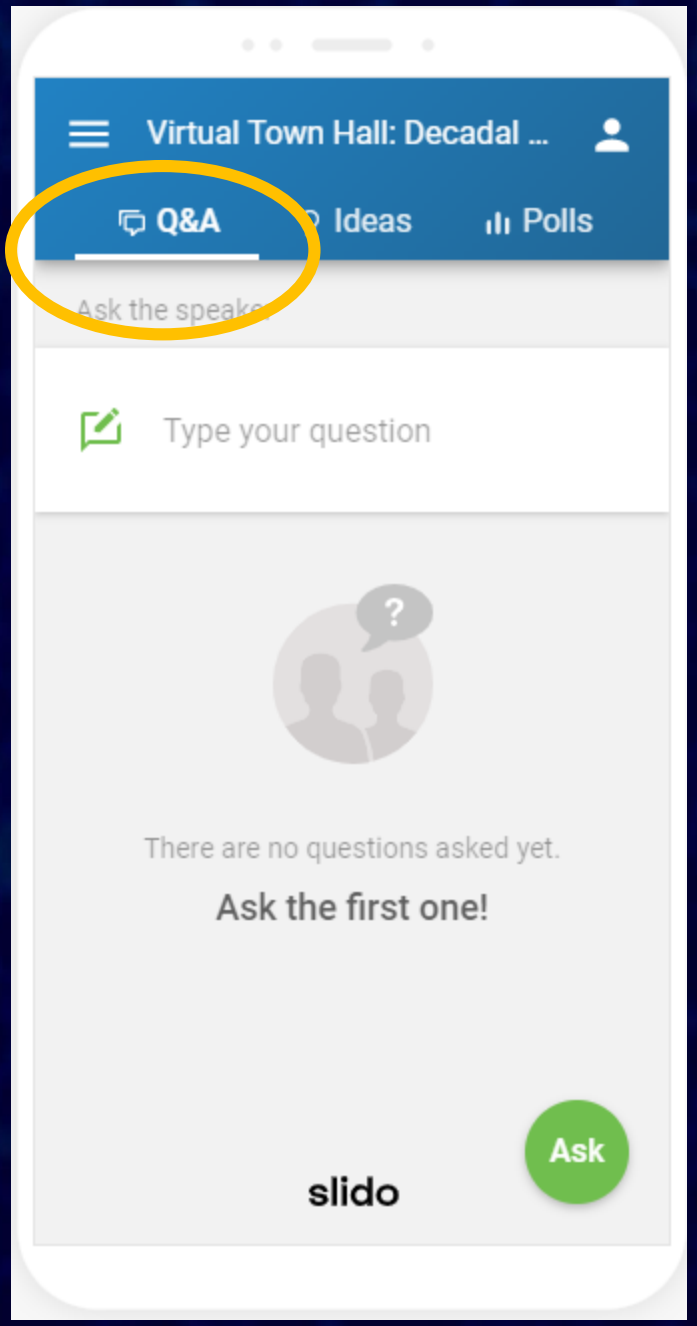
Welcoming feedback

This session will be recorded for accuracy, but with no identifiers.

Also, http://nas.edu/biophysics can be used for additional feedback anytime.

Ask your questions to the committee here!



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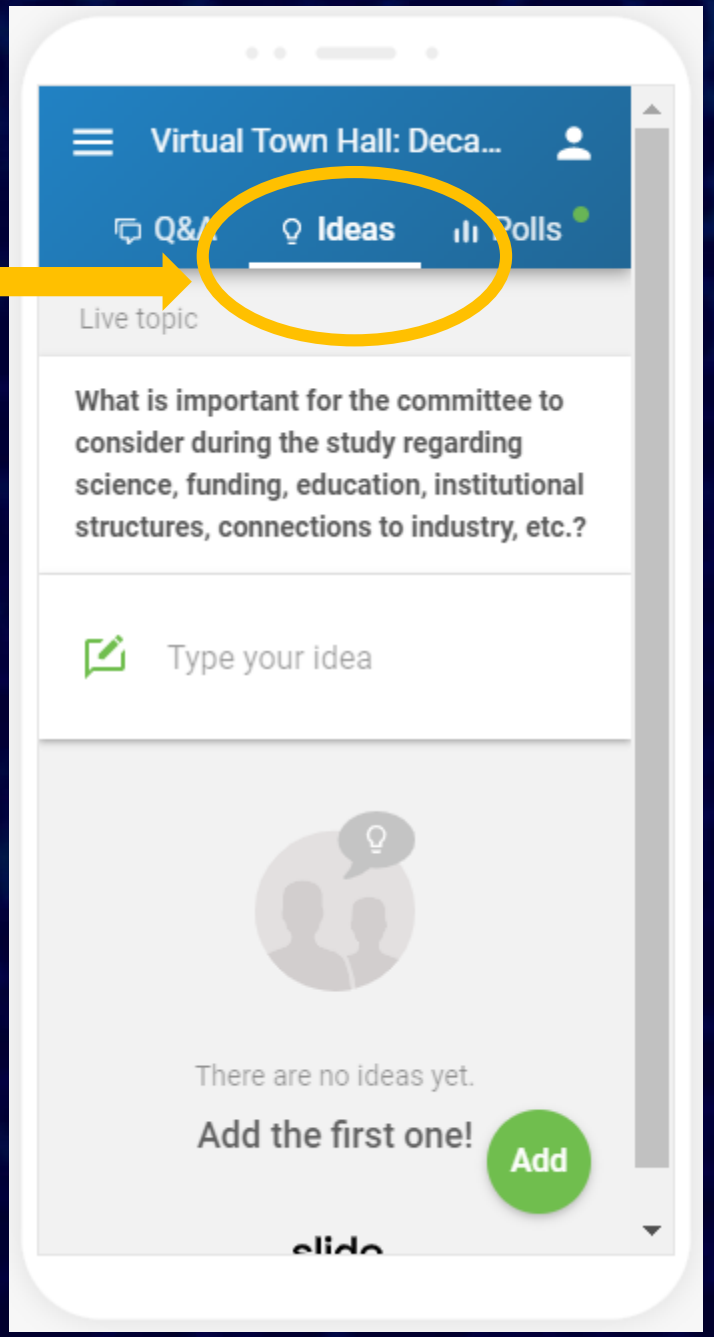
Submit your ideas here!



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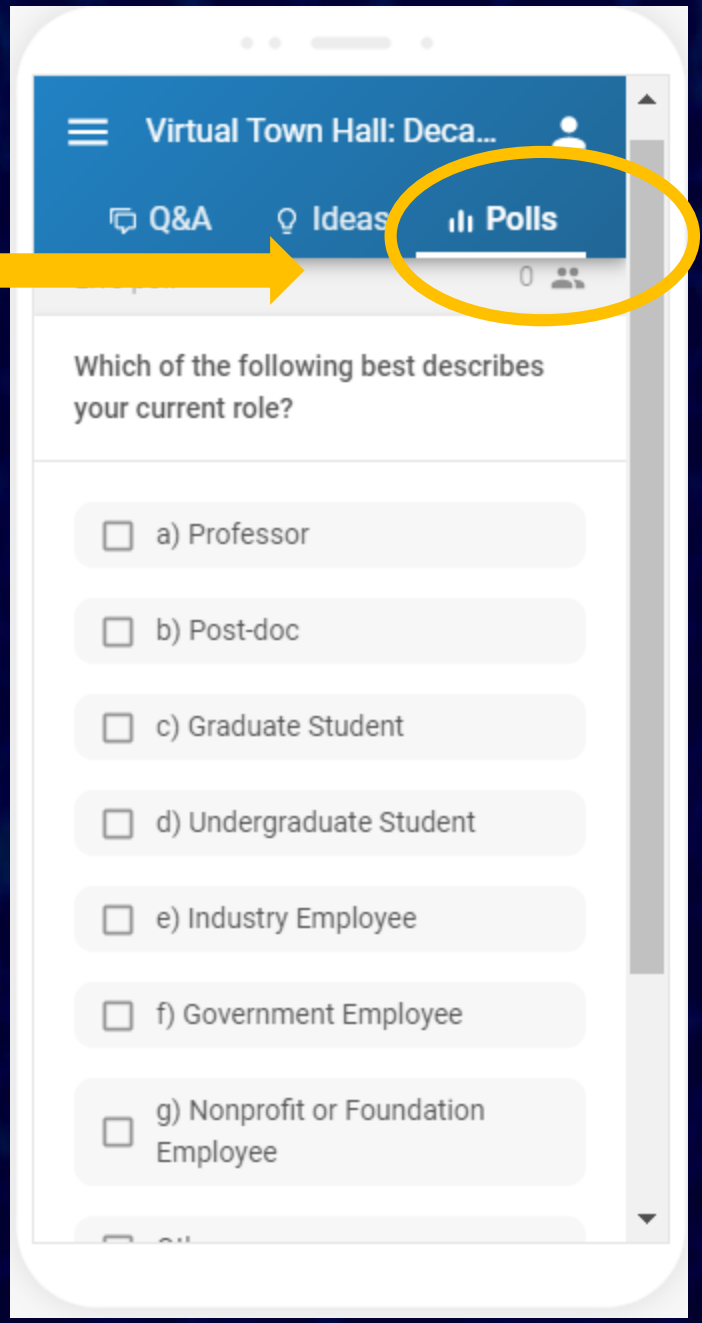
Respond to Polls here!



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Decadals?

Academies?

Consensus studies?

NASEM?

Who are the National Academies?

Three organizations comprise the Academies:

The National Academy of Sciences;
The National Academy of Engineering;
The National Academy of Medicine

Known collectively as the **National Academies of Sciences, Engineering and Medicine**

Produce reports that shape policies, inform public opinion, and advance the pursuit of science, engineering, and medicine

Academies Leadership

The **Board on Physics and Astronomy (BPA)** seeks to inform the government and the public about what is needed to continue the advancement of physics and astronomy and why doing so is important.

BPA Board Director: James Lancaster

BLS Board Director: Fran Sharples

Biophys2020 Study Director: Chris Jones

BLS Staff representative: Steven Moss

The **Board on Life Sciences (BLS)** [serves as the National Academies' focal point for a wide range of technical and policy topics in the life sciences, including bioterrorism, genomics, biodiversity conservation, and key topics in basic biomedical research, such as stem cells].

The National Academies of Sciences, Engineering, and Medicine will conduct the:

Decadal Assessment of Biophysical Sciences/Physics of Living Systems

with support from the National Science Foundation.

The committee's final report will target an audience including the sponsors and other federal agencies that support biophysical research, science policymakers, and researchers in biophysical sciences and other interdisciplinary fields.

Decadal Studies @ NASEM

Common threads –

- Collaboration, cooperation, competition,
- Societal benefits
- International considerations
- Importance of cross-disciplinary efforts

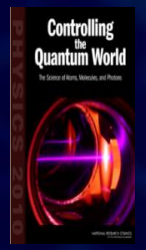
Spotlight on the field at several governmental levels

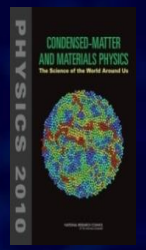
- White House OSTP
- Congress
- Federal agencies

Also important audiences in

- Academia (e.g., for training and hiring purposes, as well as research perspectives)
- Industry
- General public

Decadal Studies @ NASEM (2010)





Elementary Particle Physics 2010

Published in 2006

Condensed-Matter and Materials Physics 2010

Published in 2007

Atomic, Molecular, Optical Physics 2010

Published in 2007

Astronomy and Astrophysics 2010

Published in 2010

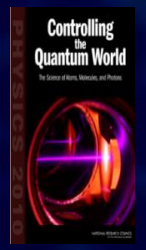
Plasma Science 2010

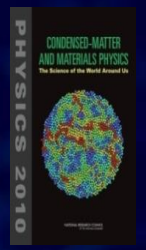
Published in 2007

Nuclear Physics 2010

Published in 2012

Decadal Studies @ NASEM (2020)





Elementary Particle Physics 2020

… starting this year

Atomic, Molecular, Optical Physics 2020

… published in Dec 2019

Plasma Science 2020

… concluding soon

Materials Science 2020

… published in 2019

Astronomy and Astrophysics 2020

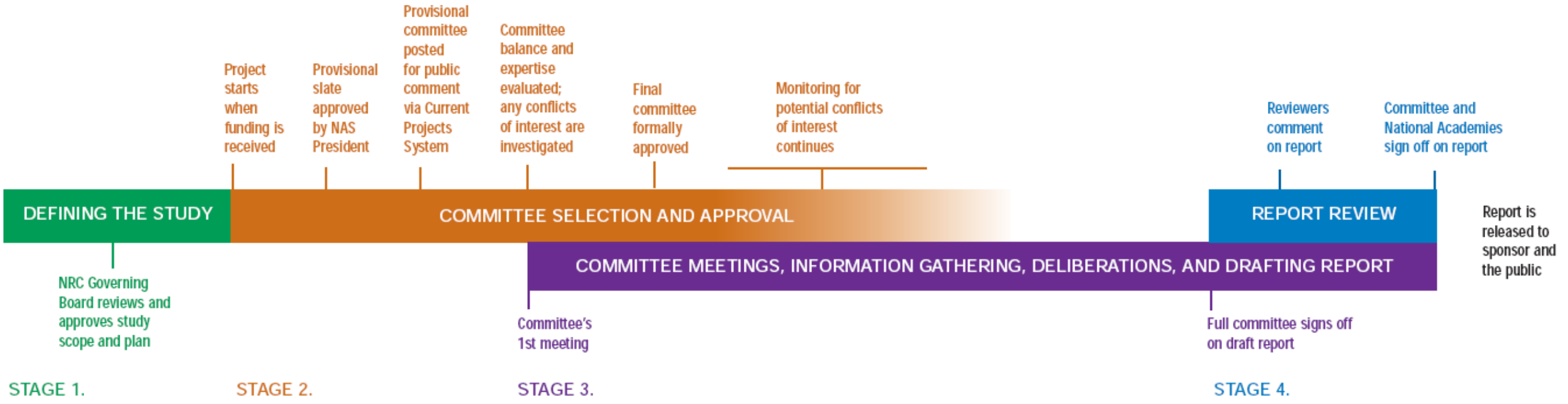
.. underway

Nuclear Physics 2020

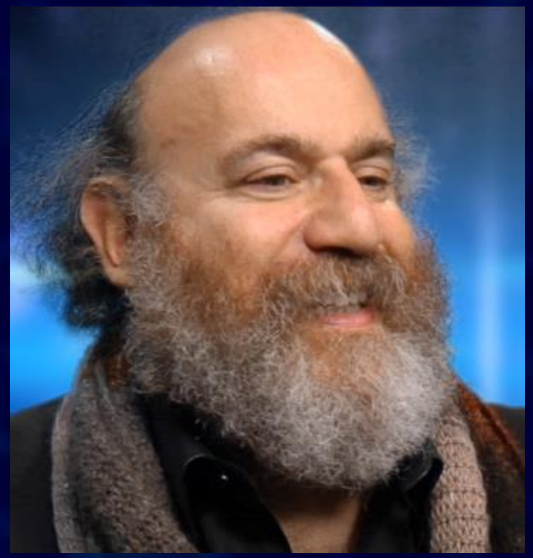
… not yet begun

Biophysics 2020

Report Progress



Speaker Introduction



William Bialek [NAS]

Committee Chair

Professor, Princeton University

Visiting Professor, The CUNY Graduate Center

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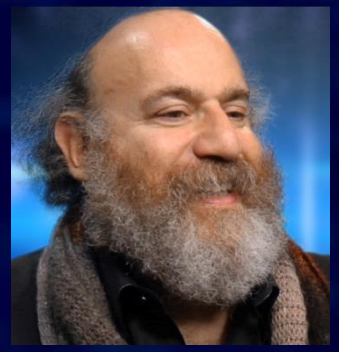
Committee Roster

William Bialek [NAS] - *Chair* - Princeton University and The CUNY Graduate Center
Bridget Carragher – New York Structural Biology Center
Ibrahim Cissé - Massachusetts Institute of Technology
Michael Desai - Harvard University
Olga Dudko - University of California, San Diego
Daniel Goldman - Georgia Institute of Technology
Jane Kondev – Brandeis University
Peter Littlewood – Argonne National Lab / The University of Chicago
Andrea Liu [NAS] - University of Pennsylvania
Mary Maxon - Lawrence Berkeley National Laboratory
José Onuchic [NAS] –Rice University
Mark Schnitzer - Stanford University
Clare Waterman [NAS] – National Heart, Lung, and Blood Institute – NIH



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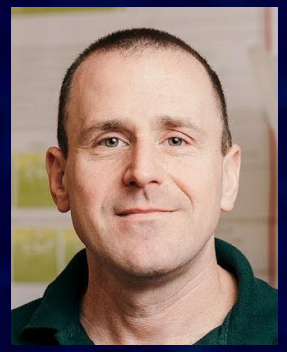

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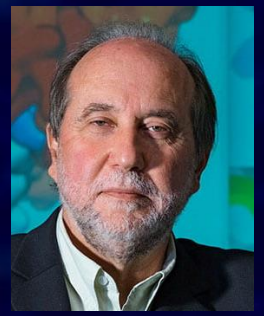

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Statement of Task

The committee will be charged with producing a comprehensive report on the status and future directions of physics of the living world. The committee's report shall:

1. Review the field of Biological Physics/Physics of Living Systems (BPPLS) to date, emphasize recent developments and accomplishments, and identify new opportunities and compelling unanswered scientific questions as well as any major scientific gaps. The focus will be on how the approaches and tools of physics can be used to advance understanding of crucial questions about living systems.

Statement of Task

2. Use selected, non-prioritized examples from BPPLS as case studies of the impact this field has had on biology and biomedicine as well as on subfields of physical and engineering science (e.g., soft condensed-matter physics, materials science, computer science). What opportunities and challenges arise from the inherently interdisciplinary nature of this interface?

3. Identify the impacts that BPPLS research is currently making and is anticipated to make in the near future to meet broader national needs and scientific initiatives.

Statement of Task

4. Identify future educational, workforce, and societal needs for BPPLS. How should students at the undergraduate and graduate levels be educated to best prepare them for careers in this field and to enable both life and physical science students to take advantage of the advances produced by BPPLS. The range of employment opportunities in this area, including academic and industry positions, will be surveyed generally.

5. Make recommendations on how the U.S. research enterprise might realize the full potential of BPPLS, specifically focusing on how funding agencies might overcome traditional boundaries to nurture this area.

In carrying out its charge, the committee should consider issues such as the state of the BPPLS community and institutional and programmatic barriers.

Looking back

What are the major Physics of Living Systems R&D achievements of the past decade, including those advances which have provided societal and/or economic benefits?

Where we are now

What Physics of Living Systems R&D fields are facing opportunities and challenges, and how might those challenges be overcome?

What are examples worth citing where the Physics of Living Systems makes a significant impact to national needs and scientific initiatives, and where might it do so in the near future?

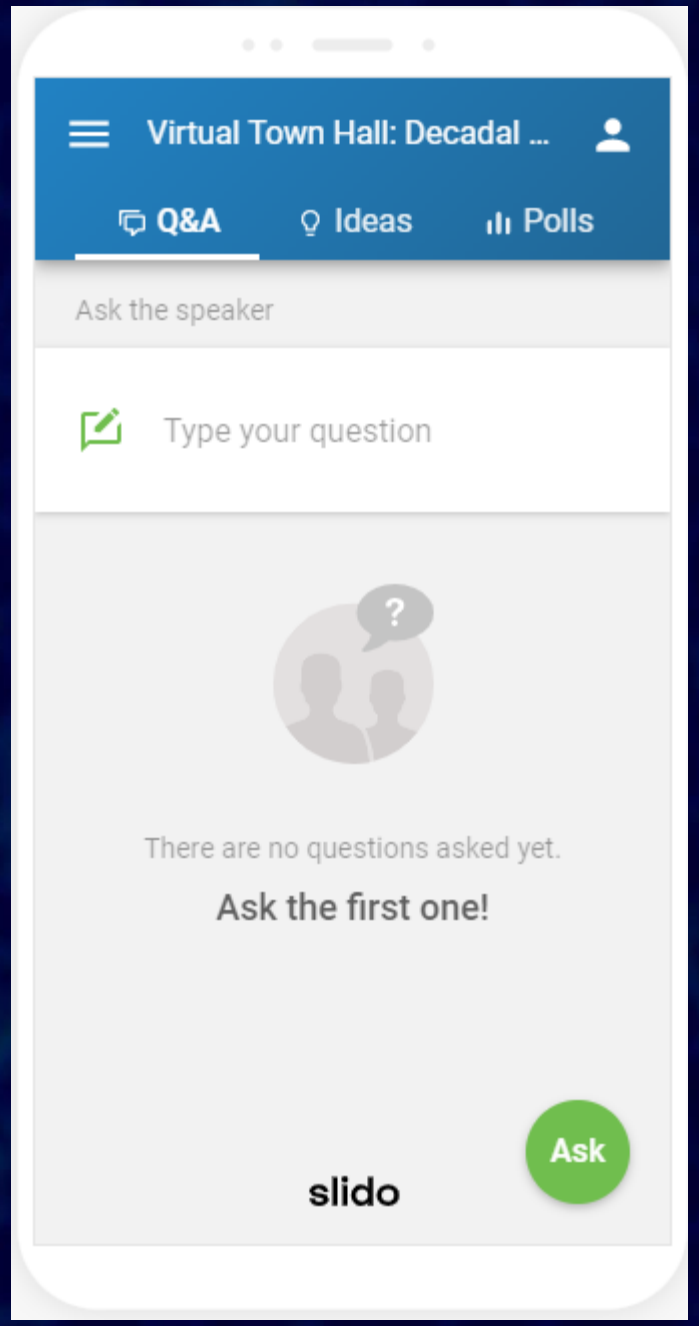
What are other new, important areas of Physics of Living Systems-related research?

Looking forward

What are critical future educational, workforce, and societal needs for the Physics of Living Systems? (e.g., consider undergraduate/graduate levels; preparation for careers in this field; and range of employment opportunities in this area)

How might the U.S. and the scientific community better develop and expand partnerships to achieve the fullest potential of Physics of Living Systems ? (e.g., consider interagency, international, and public/private partnerships)

How can we enhance diversity, attract a cross-section of talent, and make the Physics of Living Systems more inclusive?



Q&A

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For additional information and feedback opportunities, please see:

www.nas.edu/biophysics

Call for input: http://bit.ly/inputbiophys