The National Academies of
SCIENCES • ENGINEERING • MEDICINE

DIVISION ON ENGINEERING AND PHYSICAL SCIENCES
BOARD OF PHYSICS AND ASTRONOMY

Committee on Elementary Particle Physics – Progress and Promise
Meeting No. 2
November 9, 2022
Virtual Meeting
ALL TIMES IN US EASTERN STANDARD TIME (UTC-7:00)

This agenda is a draft, subject to change, and was last updated on 11/7/2022 5:19 PM

AGENDA

WEDNESDAY, NOVEMBER 9, 2022

OPEN SESSION

Livestream Link: https://vimeo.com/event/2586057

2:00 PM **Welcome to the Meeting; Brief Remarks on Meeting Agenda** ***Dr. Maria Spiropulu, Co-Chair / Dr. Michael Turner, Co-Chair /***

2:15 PM **Panel 1: Academic Leadership Discussion of Elementary Particle Physics at Universities (Group A)**
(2-3 minute introductions & 60 minute discussion period)
Panelists:
Dr. Rachel Bean, Senior Associate Dean for Math and Science in the College of Arts & Sciences, Cornell University
Dr. Willie May, Vice President for Research and Economic Development, Morgan State University
Dr. Kam Moler, Vice Provost and Dean of Research, Stanford University
Dr. Santiago Schnell, Dean of the College of Science, U. of Notre Dame

3:30 PM *Break*

4:00 PM **Panel 2: Academic Leadership Discussion of Elementary Particle Physics at Universities (Group B)**
(2-3 minute introductions & 60 minute discussion period)
Panelists:
Dr. Isi Ero-Tolliver, Dean of the School of Science, Hampton University
Dr. Frances Hellman, Emeritus Dean of the Division of Mathematical and Physical Sciences, U. of California – Berkeley
Dr. Vivian Incera, Dean of the College of Sciences, U. of Texas – Rio Grande Valley
Dr. Angela Olinto, Dean of the Physical Sciences Division, U. of Chicago
Dr. Jaetae Seo, Interim Asst. Dean of the School of Science, Hampton University

*** Placeholder Title – To Be Updated Closer to Meeting Date**

5:15 PM *Meeting Adjourns to Closed Session (or at a time at the discretion of the Co-Chairs)*

The following information is provided for any members of the general public who may be in attendance:

This meeting is being held to gather information to help the committee in its charge. This committee will examine the information and material obtained during this, and other public meetings, in an effort to inform its work. Although opinions may be stated and lively discussion may ensue, no conclusions are being drawn nor will recommendations be made. Observers who draw conclusions about the committee's work based on this meeting's discussions will be doing so prematurely.

Furthermore, individual committee members often engage in discussion and questioning for the specific purpose of probing an issue and sharpening an argument. The comments of any given committee member may not necessarily reflect the position he or she may actually hold on the subject under discussion, to say nothing of that person's future position as it may evolve in the course of the project. Any inference about an individual's position are therefore also premature.

NOTES FOR PRESENTERS

Your presentation may not include unpublished data, ITAR controlled and/or other sensitive information.

At some point a staff member will be asking you to sign a consent form allowing us to use your presentation, specifically to post it on our website.

STATEMENT OF TASK

Task Initiated on 25 August 2021

The National Academies of Sciences, Engineering, and Medicine will convene an ad hoc committee to:

- Identify the fundamental questions in particle physics that could motivate research in the next decade and beyond, irrespective of the tools and techniques to address them.
- Distinguish which of these questions could be addressed with available experimental and theoretical tools in the coming decade and which could require new techniques or approaches.
- Suggest technical research areas that could provide particle physics with new tools needed to enable new techniques and approaches.
- Suggest different ways of thinking and alternative approaches from other areas of science that could be incorporated into and benefit the overall particle physics enterprise.

Speaker Biographies

RACHEL BEAN is Senior Associate Dean for Math and Science in the College of Arts & Sciences and Professor of Astronomy at Cornell University. Bean's work centers on extracting information about cosmological theories using observations of the cosmic microwave background (CMB) and large scale structure (galaxies and clusters of galaxies), in particular working to understand the nature of dark energy, the properties of gravity on cosmic scales and the fundamental origins of primordial inflation. Bean is involved in the Vera Rubin Telescope Dark Energy Science Collaboration, the Dark Energy Spectroscopic Instrument science team, the NASA Euclid science team and the NASA Roman High Latitude Survey Science Investigation Team. Bean is also involved in CMB/sub-millimeter experiments including the Atacama Cosmology Telescope, the Simons Observatory, CMB-S4 and the Cornell-led FYST. Bean has been awarded the Breakthrough Prize in Fundamental Physics and was elected a Fellow of the American Physical Society. Bean earned a Ph.D. in physics from Imperial College, University of London.

ISI ERO-TOLLIVER is Dean of the School of Science at Hampton University. Ero-Tolliver's current research focuses on best practices for exposure, recruitment, and retention of under-represented minorities into the pipeline and watershed of STEM using model-based reasoning, Course-based Undergraduate Research Experiences (CURE) authentic research experiences, and intentional mentorship. Ero-Tolliver is the principal investigator (PI) of the NSF Robert Noyce Teacher Scholarship Program, Co-PI of the NSF CURENet2 Mobile and the Co-PI of the DoD Center of Excellence in STEM Scholars Program at Hampton University. Ero-Tolliver currently serves on the board of reviewers for the journal Education and Urban Society. Ero-Tolliver earned a Ph.D. in Interdisciplinary Studies, Biological Sciences and Science Education from Vanderbilt University.

FRANCES HELLMAN is Emeritus Dean of the Division of Mathematical and Physical Sciences and current Professor of Physics at the University of California, Berkeley. Hellman's research interests are in the thermodynamic and temperature-dependent properties of materials. Current projects include ferromagnetic and antiferromagnetic thin films and nanoparticles, studying the effects of disorder on the magnetic, transport, and thermodynamic properties of magnetic materials and relaxor ferroelectrics, and low temperature thermal properties of amorphous materials. Hellman has been on a large number of national and local science boards, including the NSF Advisory Board on Math and Physical Sciences, the NRC Board on Physics and Astronomy, the NRC Solid State Sciences Committee, and the DOE Division of Materials Science and Engineering Council among others. Hellman has won the APS Keithley Award, is a Fellow of the APS, and has been Chair of the APS Division of Materials Physics and the APS Topical Group on Magnetism and its Applications. Hellman earned a Ph.D. in Applied Physics from Stanford University.

VIVIAN INCERA is Dean of the College of Sciences at the University of Texas, Rio Grande Valley. Incera is a high-energy theorist with research interests that frequently cross the formal boundaries of other areas. Incera has worked on the interface of high energy and nuclear physics, nuclear astrophysics, and condensed matter; often on the effects of electric and magnetic fields at very large scales like neutron stars; or very small scales like string theories and condensed matter. Incera is an accomplished academic leader, whose leadership style contributed to significantly increasing the research performance, diversity, and national reputation of the departments Incera led. Incera has served on several advisory boards, on the Committee on Minorities of the APS, and as the Elected Chair of the Texas Section of the APS. Incera was the Dr. C. Sharp Cook Chair in Physics at the University of Texas at El Paso and received a national award for Leadership in College-level Promotion of Education. Incera earned a Ph.D. in Theoretical Physics from the Lebedev Physical Institute of the Russian Academy of Sciences.

WILLIE MAY is Vice President for Research and Economic Development at Morgan State University. In this role, May helps develop and support institutional and cross-disciplinary research initiatives, promote excellence in research activities and scholarship, and research administration. May previously served as Director of the National Institute of

Standards and Technology (NIST) and Under Secretary of Commerce for Standards and Technology. May led NIST's research and measurement service programs in chemistry-related areas for decades, focused in the areas of trace organic analytical chemistry and physico-chemical properties of organic compounds. May has numerous honors including American Chemical Society Distinguished Service in the Advancement of Analytical Chemistry Award; Department of Commerce Gold, Silver and Bronze Medal Awards; Arthur Flemming Award for Outstanding Federal Service; and Henry Hill Awards for outstanding contributions in Chemistry. May earned a Ph. D. in Chemistry from the University of Maryland, College Park.

KATHRYN MOLER is the Vice Provost and Dean of Research, the Marvin Chodorow Professor, and Professor of Applied Physics and of Physics at Stanford University. Moler was previously the Senior Associate Dean of Natural Sciences in the School of Humanities and Sciences and the Director of the Stanford Nano Shared Facilities. Moler is a member of the NanoFront (TU-Delft/Leiden) Scientific Advisory Board and the Physics Frontier Center—Joint Quantum Institute Advisory Board. Moler conducts research in magnetic imaging, develops tools that measure nanoscale magnetic fields, and studies quantum materials and devices. Among other honors, Moler received a national Presidential Early Career Award for Scientists and Engineers and the William L. McMillan Award from the University of Illinois Urbana-Champaign, held a Packard Fellowship for Science and Engineering, and was elected a Fellow of the American Physical Society. Moler earned a Ph.D. in Physics from Stanford University.

ANGELA V. OLINTO is the Dean of the Division of the Physical Sciences at the University of Chicago and the Albert A. Michelson Distinguished Service Professor in the Department of Astronomy and Astrophysics and the Kavli Institute for Cosmological Physics at the University of Chicago. Olinto is best known for contributions to the study of the structure of neutron stars, primordial inflationary theory, cosmic magnetic fields, the nature of the dark matter, and the origin of the highest energy cosmic rays, gamma-rays, and neutrinos. Olinto is the principal investigator (PI) of the Probe of Extreme Multi-Messenger Astrophysics space mission, PI of the Extreme Universe Space Observatory on a super pressure balloon mission, and was a member of the Pierre Auger Observatory. Olinto is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and received the Chaire d'Excellence Award of the French Agence Nationale de Recherche. Olinto earned a Ph.D. in Physics from the Massachusetts Institute of Technology.

SANTIAGO SCHNELL is the William K. Warren Foundation Dean of the College of Science and Professor of Biological Sciences and Applied and Computational Mathematics and Statistics at the University of Notre Dame. Schnell's research program departs from the premise that there is a continuum between health and disease, focusing on two broad areas: the development of standard-methods to obtain high quality measurements in the biological and medical sciences, and the development of mathematical models of complex biomedical systems with the goal of identifying the key mechanisms underlying the behavior of the system as a whole. Schnell currently serves as the Editor-in-Chief for the journal Mathematical Biosciences and a member of the Standards for Reporting Enzymology Data Commission. Schnell was previously the President of the Society of Mathematical Biology. Schnell is a life member of the Society for the Advancement of Hispanics/Chicanos and Native Americans in Science, and Fellow of the American Association for the Advancement of Science, of the Latin American Academy of Sciences and recipient of the Arthur T. Winfree Prize. Schnell earned a Ph.D. in Mathematics from the University of Oxford.

FELIX JAETAE SEO is Interim Assistant Dean of the School of Science and Chair and Professor of Physics at Hampton Univeristy. Seo's research interests include optical dynamics by coupling of exciton to surface plasmon polariton, surface-enhanced Raman scattering, ultrafast and nonlinear optical and electronic dynamics, and temporal, spectral, and spatial energy transitions and dynamics of organic and inorganic nanoscale materials and systems for industrial and defense applications. In addition to the intense research activities for maintaining and developing strong research and educational programs, outreach and dissemination have been also important parts of Seo's academic activities. Seo is currently the Director of the Advanced Center for Laser Science and Spectroscopy, and Group Leader of Nanophotonics

and Quantum Optics. Seo is currently serving as an Editor-in-Chief for the Journal of Photonics and Optoelectronics. Seo earned a Ph.D. in Physics from Hampton University.