AGENDA/PROGRAM
Friday November 10, Morning

NYSS-APS executive committee meeting (Location: Reamer Campus Center)	
8:30 - 9:00	APS Executive Board Breakfast (Location: Reamer Cafeteria)
9:00 – 12:00	APS Executive Board Meeting (Location: Reamer 410)

Friday November 10, Afternoon

Registration and Opening Remarks (Location: College Park Hall: CPH 101-104)	
12:00 -	Registration: Ms. Lynnette Stec and SPS students
1:00 - 1:15	Opening Remarks: **Prof. S. Amanuel** (Logistics and Announcements) **Prof. R. Koopmann**, Chair of Physics & Astronomy **Prof. J. Fredricks**, Dean of Academic Departments & Programs

Session I: Chair Prof. H. Watson (Location: College Park Hall: CPH 101-104)	
1:15 – 2:00	**Saul Teukolsky**, Cornell University *"Testing general relativity with LIGO"*
2:00 - 2:45	**Manuela Campanelli**, RIT *"Numerical Relativity in the Multimessenger Era"*

2:45 - 3:00	Coffee Break (Location: College Park Hall: CPH 101-104)

Session II: Chair Prof. C. Orzel (Location: College Park Hall: CPH 101-104)	
3:00 - 3:45	**Zsuzsa Marka**, Columbia University *"Gravitational waves, neutrinos and photons"*
3:45 – 4:30	**Stefan Ballmer**, Syracuse University, *"Next generation gravitational wave detectors"*

4:30 - 6:00	**Poster Session I (NYSS-APS poster session)** Networking and refreshments plus cash bar (Location: College Park Hall: CPH 101-104)

Friday November 10, Evening

Banquet and Keynote Speech (Location: College Park Hall: CPH 101-104)	
6:00 - 7:15	**Banquet**
7:30 - 8:15	**Keynote Speaker: Prof. Rainer Weiss**, MIT *"The remarkable gamble the National Science Foundation took with LIGO"* Introduction by **Prof. S. Maleki**

Saturday November 11, Morning

8:30 - 9:-00	Breakfast - Bagels, Fruit, Coffee, Juice (Location: College Park Hall: CPH 101-104)
Session III: Chair Prof. F. Wilkin (Location: College Park Hall: CPH 101-104)	
9:00 – 9:45	**Ryan Fisher**, Syracuse University, *"LIGO searches and status"*
9:45 – 10:30	**Maura McLaughlin**, West Virginia University "*A Galactic Scale Gravitational Wave Observatory"*
10:30 – 10:45	Coffee Break (Location: College Park Hall: CPH 100)

Session IV: Chair Prof. J. Marr (Location: College Park Hall: CPH 101-104)	
10:45 – 11:30	**Richard O'Shaughnessy**, RIT, *"Compact object astrophysics and gravitational wave astronomy"*
11:30 – 12:15	**Steven Penn**, Hobart and William Smith Colleges *"From Thin Films to Black Holes: the impact of Thermal Noise in Gravitational Wave Astronomy"*
12:15	**Lunchbox Pickup** (Location: College Park Hall: CPH 101-104)

Saturday November 11, Afternoon:

12:30 - 1:30	**Poster Session II (ASNY poster session)** (Location: Olin Rotunda)

1:30 - 2:00	**ASNY Graduate Student Prize Talk**: **Sarah Pearson,** Columbia *"The Milky Way's Galactic bar can punch holes in stellar streams"*
2:00 – 2:30	**ASNY Undergraduate Student Prize Talk**: **Briley Lewis,** Columbia - *"Direct Imaging of Exoplanets with Project 1640"*
2:30 – 2:45	**Break**
2:45 – 3:00	**Yashashree Jadhav,** RIT - *"Monsters on the move: Gravitational wave recoiling supermassive black hole candidates"*
3:00 – 3:15	**Joe Patterson**, Columbia *"Gravitational radiation as the driver in ultracompact binaries"*
3:15 – 3:30	**Kevin Cooke**, RIT - *"Ancestors of the Brightest Cluster Galaxies"*
3:30 – 3:45	**Chi Nguyen**, RIT - *"Cosmic Background Infrared ExpeRiment 2: Probing Structure Formation with Near-Infrared Fluctuations"*
3:45 – 4:00	**Phil Nicholson**, Cornell - *"Cassini's Grand Finale"*

ABSTRACTS OF INVITED TALKS

"Testing general relativity with LIGO"

Saul Teukolsky

Cornell University

General relativity is a very successful theory of gravity. So far no discrepancies with experiment are known. Yet at a fundamental level the theory is incomplete, since it does not include quantum effects. Modern attempts to make a quantum description of gravity predict small deviations from the predictions of general relativity. The detection of gravitational waves from colliding black holes has opened up new possibilities for finally testing general relativity in the strong-field regime. I will describe how LIGO is already able to perform interesting tests. I will also discuss the future of such tests, both with ground-based and space-based detectors.

"Numerical Relativity in the Multimessenger Era"

Manuela Campanelli*, RIT*

The recent discovery of gravitational waves by Advanced LIGO ushered in a new kind of astronomy, one potentially integrating its findings with those obtained from electromagnetic and/or neutrino observations. Multi-messenger astronomy promises to revolutionize our understanding of the universe by providing dramatically contrasting views of the same objects. To understand this unprecedented wealth of observational evidence, computer intensive theoretical calculations of the Einstein field equations, coupled with the equations of magneto-hydrodynamics, are required in order to link data with underlying physics. In this talk, I will provide a review on the recent progress in this exciting field of computational astrophysics. With Advanced LIGO now fully operational and the detection of additional gravitational wave events imminent, we expect that there will be a surge in the number of researchers interested in performing simulations of compact binary mergers.

"Gravitational waves, neutrinos and photons"

Zsuzsa Marka, Columbia University

On August 17, 2017 the merger of two neutron stars was detected in the form of gravitational-waves by LIGO/Virgo. As a result of over a decade long preparation for multimessenger observations the event was also seen electromagnetically across the full spectrum. The history and future of the comprehensive multimessenger effort using gravitational-waves, neutrinos, and electromagnetic counterparts will be discussed.

"Next generation gravitational wave detectors"

Stefan Ballmer, Syracuse University

With its first two observation runs Advanced LIGO gave us a first glimpse of what gravitational wave astronomy can tell us about the yet unknown parts of the universe. To sustain this new frontier in astronomy the sensitivity of the current detectors will have to be improved. I will look at upgrade options for terrestrial gravitational-wave detectors, and I will review the technology needed for future gravitational-wave detectors. This next generation of gravitational wave observatories can provide the backbone infrastructure for gravitational-wave astronomy for the rest of the 21st century.

KEYNOTE ADDRESS

"The remarkable gamble the National Science Foundation took with LIGO"

Rainer Weiss, *MIT*

Despite the fact that no one had ever measured motions as small as 1/1000 of a nuclear radius or that there was certain evidence for gravitational radiation let alone hard knowledge of gravitational wave sources, in the 1970's the NSF began to support a new program in gravitational wave astrophysics. The visionary responsible for this was Richard Isaacson then Program Director for Gravity at the NSF. The talk is about how he organized and guided the process to make LIGO a reality - in short it is the history of LIGO.

"LIGO searches and status"

Ryan Fisher, Syracuse University

The first joint observing run of the Advanced Laser Interferometer Gravitational-wave Observatory (LIGO) and the Advanced Virgo observatory is now complete. The addition of the Advanced Virgo observatory to the already successful Advanced LIGO detector network enables sources of gravitational wave signals to be located on the sky to greater accuracy. I will present highlights from the results of searches for gravitational waves in LIGO double-detector and LIGO-Virgo triple-detector data. The talk will conclude with a brief description of the upgrades planned for the detectors before the next observing run begins.

"A Galactic Scale Gravitational Wave Observatory"

Maura McLaughlin

West Virginia University

Pulsars are rapidly rotating neutron stars with phenomenal rotational stability that can be used as celestial clocks in a variety of fundamental physics experiments. One of these experiments involves using an array of precisely timed millisecond pulsars to detect perturbations due to gravitational waves. The gravitational waves detectable through pulsar timing will most likely result from an ensemble of supermassive black hole binaries. I will describe the efforts of the North American Nanohertz Observatory for Gravitational Waves (NANOGrav), a collaboration which monitors an array of over 50 millisecond pulsars with the Green Bank Telescope and Arecibo Observatory. The most recent limits on various types of gravitational wave sources will be presented, and I will show how these limits are already constraining models for galaxy formation and evolution. I will then describe the dramatic gains in sensitivity that are expected from discoveries of millisecond pulsars, more sensitive instrumentation, improved detection algorithms, and international collaboration and show that detection is possible before the end of the decade.

"Compact object astrophysics and gravitational wave astronomy"

Richard O'Shaughnessy, RIT

Advanced LIGO and Virgo have begun to regularly discover the gravitational wave signal from coalescing compact binaries -- binaries composed of black holes or neutron stars. In this talk, I describe what we know about how these objects form; what we're beginning to learn from gravitational wave observations about astrophysics like the lives and deaths of massive stars; and what we expect to learn in the next several years with gravitational waves and other messengers.

"From Thin Films to Black Holes: the impact of Thermal Noise in Gravitational Wave Astronomy"

Steven Penn

Hobart and William Smith Colleges

The detection of gravitational waves was a revolutionary event in physics and astronomy. The new field of gravitational wave astronomy has the potential to address fundamental questions about our universe and to probe the limits of general relativity. These investigations would benefit greatly from an increased GW detection rate, but the required improvements in sensitivity demand significant reductions in thermal noise. I will present the current research efforts to understand and reduce thermal noise for future GW detectors.

List of Contributed Posters

1. ***Heightened figure of merit for lithium-doped copper(I) iodide thin films***

   Alexander Brodie, Gabrielle DeSantis, Jennifer Gunning, Nancy Huang, Jake Kaufman, Mairead McCarran, Jordan Shaked, and Marissa R. Civic*
   Freshman Research Immersion, Binghamton University, Vestal, NY

2. ***Heightened figure of merit for lithium-doped copper(I) iodide thin films***

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5. ***Equilibrium models of relativistic stars with differential rotation and toroidal magnetic fields***

   Logan Carpenter & Eric Hirschmann
   Brigham Young University - Idaho & Brigham Young University

6. ***Temporal Diffraction Signal Analysis of C. elegans Locomotion***

   Cheris Congo; Miranda Hulsey-Vincent; Dr. Jenny Magnes; Vassar College Physics and Astronomy Department

7. ***Rings of Molecular Line Emission in the Disk Orbiting the Young, Close Binary V4046 Sgr***

D. Annie Dickson-Vandervelde: RIT (Rochester, NY)
Joel Kastner: RIT (Rochester, NY)
C. Qi: Smithsonian Institution (Cambridge, MA)
THIERRY FORVEILLE: IPAG (Grenoble, France)
Pierre Hily-Blant: IPAG (Grenoble, France)
Karin Oberg: Harvard U (Cambridge, MA)
David Wilner: Smithsonian Institution
Sean Andrews: Smithsonian Institution (Cambridge, MA)
Uma Gorti: SETI Institute (Mt View, CA)
Valerie Rapson: Dudley Observatory (Schenectedy, NY)
Germano Sacco: Arectri Observatory (Florence, Italy)
Dave Principe: MIT (Cambridge, MA)

8. ***Development and Automation of an Ultra-High Vacuum System for Synthesis of 2-Dimensional Materials***

Mayuka Sasaki[1], Zachary Robinson[1], Luke Nyakiti[2]
1 – SUNY College at Brockport Department of Physics
2 – Texas A&M Departments of Marine Engineering and Material Science Engineering

9. ***Fabrication of Reproducible Micro-Bridge Structures***

Zachary Johnson, Connor Murphy, and Michael Thompson
Grove City College

10. ***CMOS-Memristor Implementation of Cellular-Automata Based Reservoir Computing***

Wilkie Olin-Ammentorp, Karsten Beckmann, Nathaniel Cady
SUNY Polytechnic Institute

11. ***New Algorithm Identifies Tidal Streams Oriented Along our Line-of-Sight***

Ziyi Lin, Heidi Jo Newberg, Paul Amy, Charles Martin, and Keighley Rockcliffe
Rensselaer Polytechnic Institute

12. ***Development of an Efficient Model Extension Method with Application to Pancreatic Cancer Microenvironment***

Mit Patel (Vassar College); Adam Butchy, BS; Khaled Sayed, MSc, Natasa Miskov-Zivanov, PhD (University of Pittsburgh- Department of Electrical and Computer Engineering)

13. Local Stellar Halo Substructure observed with Gaia and LAMOST

Thomas Donlon, Cuihua Du, Heidi Jo Newberg, Hélio Perottoni
Rensselaer Polytechnic Institute

14. Microscale Pattern Fabrication on PTFE through the Use of a Focused Electron Beam

Seth Byard, Ryan King
Grove City College, PA.

15. Fabrication of Inorganic-Organic Bicomposite Thin Films of Strontium Titanate and Poly(3,4 – ethylenedioxythiophene)

Jeffrey Berling, Steve Blum, Collier Engel (Presenting), Brianna Hawkins, Matthew Krebs (Presenting), Tyler Rowe, Alexa Schaffer, and Marissa R. Civic*
Freshman Research Immersion, Binghamton University, Vestal, NY

16. First-Principles Study of Phonon Anharmonicity in Atomically-Thin Black Phosphorus

Andrew Cupo, Damien Tristant, and Vincent Meunier
Rensselaer Polytechnic Institute

17. Measurement of sensitivity versus electron dosage of buried semiconductor features via backscattered electron simulations

Maseeh Mukhtar and Brad Thiel
SUNY Polytechnic Institute

18. Measuring Cosmic Velocity Field Evolution with a Novel Millimeter-wave Spectrometer

Victoria Butler, Mike Zemcov
Rochester Institute of Technology

19. PIXE Analysis on Artificial Turf

Skye Conlan, Michael Vineyard, Scott LaBrake, Sajju Chalise, Zack Porat
Union College

20. The Emperor's Mind in a Nutshell

Shantilal Goradia
Gravity Research Institute, Inc.

21. Generalizations of Collatz Functions to Geometric Algebras

Rafael Ceja Ayala[1], Erik Knutsen[2], Jason Turner[3], and Dr. Alejandra Alvarado[4]

(1)California State University Sacramento, (2)Humboldt State University, (3)Union College, (4)Eastern Illinois University

22. Micromotors that Produce Their Own Fuel

Daniel Broderick, SUNY University at Albany
Dr. Joseph Wang, University of California San Diego

23. Visualizing Silicide Formation via Interface Electrostatics of Metal/Semiconductor Interfaces with BEEM/W.

Nolting, C. Durcan, J. Rogers, S. Gassner, D. Pennock, J. Goldberg and V. LaBella
College of Nanoscale Science and Engineering, SUNY Polytechnic Institute

24. Order or Disorder? A Kinematic Analysis of Starburst Galaxies at z ~ 1

Brittany Vanderhoof, Jeyhan Kartaltep
Rochester Institute of Technology

25. Ancestors of the Brightest Cluster Galaxies

Kevin Cooke[1], Jeyhan Kartaltepe[1], Krystal Tyler[1], Behnam Darvish[2]
(1) Rochester Institute of Technology, (2) California Institute of Technology

26. First principles simulation of atomic displacement in two-dimensional transition metal dichalcogenides under electron irradiation

Anthony Yoshimura and Vincent Meunier
Rensselaer Polytechnic Institute

27. Mapping the circumnuclear gas of NGC 4180 and MCG-06-30-015

Trent Seelig
Rochester Institute of Technology

28. Monsters on the move: Gravitational wave recoiling supermassive black hole candidates

Yashashree Jadhav (Rochester Institute of Technology , Dr. Andrew Robinson (Rochester Institute of Technology), Dr. Davide Lena (Netherlands Institute for Space Research)

29. Resolved Stellar Populations in High Redshift Galaxies

Meaghann Stoelting
Rochester Institute of Technology

30. Challenges and Joy of Teaching an Undergraduate Course in Gravitational Astronomy

Manju Prakash,
Hofstra University

31. Making Lemonade out of LEMON: Improved Photometry Processing Software

Mackenna Wood, Dr. Joshua Thomas
Clarkson University

32. Vibrational modes in few layer WTe_2 revealed by first-principles calculations

Natalya Sheremetyeva
Rensselaer Polytechnic Institute

33. Investigating Barkhausen Noise in Relaxor Ferroelectrics

Jennifer Freedberg, Thomas Kennedy, Xinyang Zhang, Dr. Eugene Colla, Dr. Michael Weissman
University of Illinois at Urbana-Champaign, Rensselaer Polytechnic Institute

34. A statistical model of chamber pressure for application in Monte Carlo simulations of sputter depositions

William "Joe" Meese; Toh-Ming Lu, PhD.
Rensselaer Polytechnic Institute

35. Vibrational modes in few layer WTe_2 revealed by first-principles calculations

Natalya Sheremetyeva
Rensselaer Polytechnic Institute

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University of Illinois at Urbana-Champaign, Rensselaer Polytechnic Institute

37. A statistical model of chamber pressure for application in Monte Carlo simulations of sputter depositions

William "Joe" Meese; Toh-Ming Lu, PhD.
Rensselaer Polytechnic Institute

38. Electrical properties of carbon doped inorganic / organic heterojunctions

Marissa Cimmino, Evan Kindig, Colin MacHaffie, Evan Moravansky (Presenting), Ryan Moses, Matthew Troiano, Ian Wang, and Marissa R. Civic
Freshman Research Immersion, Binghamton University