

## PRABHAKAR MISRA

***Professor of Physics & Fellow of The American Physical Society (APS),  
Fulbright Scholar & NASA Administrator's Fellow***

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Wikipedia Page: [http://en.wikipedia.org/wiki/Prabhakar\\_Misra](http://en.wikipedia.org/wiki/Prabhakar_Misra)

### EDUCATION

**Ph.D.** (Physics), The Ohio State University, Columbus, OH, 1986.

**M.S.** (Physics), Carnegie-Mellon University, Pittsburgh, PA, 1981.

**M.Sc.** (Physics), University of Calcutta, India, 1978.

**B.Sc.** (Physics Hons.), St. Xavier's College, University of Calcutta, India, 1975.

### EMPLOYMENT & PROFESSIONAL APPOINTMENTS

**Professor**, Department of Physics & Astronomy, Howard University, 1997-present

**Director of Undergraduate Studies**, Department of Physics & Astronomy, Howard University, 2018-present

**Chair**, Department of Physics & Astronomy, Howard University, 2010-14

**Chair**, Division of Natural Sciences, College of Arts & Sciences, Howard University, 2012-14

**President**, Sigma Xi –The Scientific Research Society - Howard University Chapter, 2013-14

**Research Affiliate & Investigator**, National Consortium for the Study of Terrorism & Responses to Terrorism (START), University of Maryland, College Park, MD, 2014-present

**Director of Graduate Studies**, Department of Physics & Astronomy, Howard University, 2006-10

**Visiting Scientist/NASA Affiliate**, Planetary Environments Laboratory (PEL), Goddard Space Flight Center, Greenbelt, MD, 2010-present

**NASA DC Space Grant Consortium Faculty Fellow**, Summer 2010 & 2009: Goddard Space Flight Center, Atmospheric Experiments-Planetary Environments Laboratory/Code 699

**NAI-MIRS Faculty Fellow**, Summer & Fall 2008, & Summer 2012, Atmospheric Experiments-Planetary Environments Laboratory/Code 699, NASA Goddard Space Flight Center

**NASA ESMD Faculty Fellow**, Summer 2007: Langley Research Center, Hampton, VA, & Goddard Space Flight Center, Laser & Electro-Optics Branch/Code 554, & Summer 2008: Goddard Space Flight Center, Laser & Electro-Optics Branch/Code 554, Greenbelt, MD

**Fulbright Scholar & Visiting Professor**, Department of Chemical Sciences, Tata Institute of Fundamental Research, Mumbai, India, 2004-05

**NASA Administrator's Fellow**, Aeronautics & Space Engineering Board, The National Academy of Sciences, Washington, DC, 2000-01

**NASA Administrator's Fellow**, Laser & Electro-Optics Branch/Code 554, NASA Goddard Space Flight Center, Greenbelt, MD, 1999-2000

**Associate Professor (Tenured)**, Department of Physics & Astronomy, Howard University, 1992-97

**Assistant Professor**, Department of Physics & Astronomy, Howard University, 1988-92

**Visiting Scholar**, Department of Chemistry, Northwestern University, Evanston, IL, 1990

**Postdoctoral Research Fellow**, Laser Spectroscopy Facility, The Ohio State University, Columbus, OH, 1986-88

## HONORS & AWARDS

- **Nominated for the 2023 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM)**, National Science Foundation, Alexandria, VA
- **Nominated for the 2019 American Association for the Advancement of Science (AAAS) Lifetime Mentor Award**, American Association for the Advancement of Science, Washington, DC
- **Robert H. Goddard 2018 Team Award** for Exceptional Achievement for Science, as part of the DREAM2 Center for Space Environments, NASA Goddard Space Flight Center. The citation certificate given on May 16, 2019, reads “*For exceptional applications of space environmental science to exploration endeavors.*”
- **Recognized by the Optical Society of America Foundation (OSAF) “Honor Your Mentor” for Exemplary Mentoring Upon the Recommendation of Dr. Tariq Ahmido, NIST, Gaithersburg, MD (2016)** [[http://www.osa.org/en-us/foundation/tributes/honor\\_mentor/](http://www.osa.org/en-us/foundation/tributes/honor_mentor/)]
- **Excellence in Research Productivity Award**, Division of Natural Sciences, College of Arts & Sciences (COAS), Howard University, 1<sup>st</sup> COAS Annual Faculty & Staff Award Ceremony, April 2016.
- **Elected Fellow of the American Physical Society (APS)**, 2015. The citation of the Fellowship Certificate presented by the Division of Condensed Matter Physics reads “*For sustained contributions to the spectroscopy of the condensed phases and commitment and exemplary mentoring of underrepresented students.*” Election to Fellowship in APS is an honor and distinction, in that it is limited to no more than one half of one percent of the membership of the American Physical Society.
- **Selected MSI DHS Summer Faculty Fellow**, May-August 2014, University of Maryland, START-Department of Homeland Security (DHS) Center of Excellence, & Visiting Faculty/Affiliate 2015-16 on a follow-up grant
- **President, Howard University Chapter of Sigma Xi – the Scientific Research Society**, 2013-14
- **Best Research Paper Award**, Optoelectronics, Photonics & Applied Physics (OPAP) Annual International Conference, Singapore, February 4-5, 2013
- **NASA Astrobiology Institute Minority Institute Research Support (NAI-MIRS) Program Award** (June-August, 2012; Sample Analysis at Mars (SAM) Project, NASA Goddard Space Flight Center, Greenbelt, MD), followed by a research award “Fluorescence and Raman Spectroscopy of Organic Molecules of Relevance to the Spectral Library of Potential Contaminants for the Mars Science Laboratory Mission” (September 2012-June 2013)
- **NASA DC Space Grant Consortium Faculty Fellowship Award** (June-August 2010 & 2009) Target Organic Contaminant Library Development in Support of the Sample Analysis at Mars (SAM) Instrumentation Measurements for the Mars Science Laboratory, Atmospheric Experiments - Planetary Environments Laboratory/Code 699, Goddard Space Flight Center, Greenbelt, MD
- **NASA Astrobiology Institute Minority Institute Research Support (NAI-MIRS) Program Award** (June-December 2008; Sample Analysis at Mars (SAM) Project, NASA Goddard Space Flight Center, Greenbelt, MD)
- **Alfred P. Sloan Foundation Certificate of Appreciation** (January 25, 2008) for commitment to advancing underrepresented minority students in Mathematics, Science, & Engineering, and for leadership in the Sloan Foundation Minority Ph.D. program
- **NASA ESMD Faculty Fellowship Award** (June-August 2007 & June 2008), NASA, Kennedy Space Center, FL, & NASA HQ, Washington, DC
- **Fulbright Scholar Award** (Dec 2004 - Aug 2005), J. William Fulbright Foreign Scholarship Board, Washington, DC (Tata Institute of Fundamental Research, Colaba, Mumbai, India)

- **NASA Administrator's Fellowship Program Award** (July 1, 1999-August 15, 2001), National Research Council, Washington, DC
- **Johnetta G. Davis Student Service Award** (May 1998), Graduate School of Arts & Sciences, Howard University, Washington, DC
- **Professional Profile Cited in Marquis Who's Who in Science & Engineering** (1992-93); a Companion Volume to Who's Who in America, and in *Who's Who Among America's Teachers* (1996 & 2006-07)
- **Researcher of the Month** (April 1993), BIOS, Graduate School of Arts & Sciences, Howard University, Washington, DC
- **Sigma Pi Sigma (Physics Honor Society)** (Inducted May 2, 1991), Howard University, Washington, DC

### CONFERENCE PROGRAM COMMITTEES & SESSIONS CHAIR

**Symposium Co-Chair**, Optoelectronic Properties & Characterization of Emergent Semiconductor Materials, 26<sup>th</sup> International Conference on Computational & Experimental Engineering and Sciences, ICCES 2020-21, Phuket, Thailand, January 6-10, 2021.

**Invited Plenary Speaker & Sessions Co-Chair**, First North Indian Science Congress, Babarao Bhimsaheb Ambedkar University, Lucknow, Uttar Pradesh, India, January 10-11, 2018.

**Invited Speaker**, International Conference on Computational & Experimental and Engineering Sciences (ICCES 2017), Funchal, Madeira Island, Portugal, June 26-30, 2017.

**Invited Speaker and Session Chair**, IC-EEE 2015 - International Conference on Energy Harvesting Storage and Conversion, February 4–7, 2015, Cochin University of Science and Technology, Cochin, India.

**Invited Speaker and Plenary Session Co-Chair**, 17th International Workshop on Physics of Semiconductor Devices (IWPSD 2013), Amity University, Noida, India, December 10-13, 2013.

**Sessions Chair**, Day 2, Annual International Conference on Optoelectronics, Photonics & Applied Physics (OPAP), February 4-5, 2013, Singapore.

**Nanotechnology Sessions Chair**, XVI International Workshop on the Physics of Semiconductor Devices, IWPSD 2011, IIT Kanpur, India, December 19-22, 2011.

**Member of Program Committee and Chair of Sessions**: International Conference on LASERS '93 (Lake Tahoe, NV, Dec 93); LASERS '94 (Quebec, Canada, Dec 94), LASERS '95 (Charleston, SC, Dec 95) , LASERS '96 (Portland, OR, Dec 96), LASERS '97 (New Orleans, LA, Dec 97), LASERS '98 (Tucson, AZ, Dec 98), LASERS '99 (Quebec, Canada, Dec 99), LASERS 2000 (Albuquerque, NM, Dec 2000), LASERS 2001 (Tucson, AZ, Dec 2001); ICCES '09 (Phuket, Thailand, April 2009); ICCES'10 (Las Vegas, Nevada, March 28-April 1, 2010).

### PUBLIC OUTREACH

**Participated in a radio show (The 21<sup>st</sup>) on National Public Radio (NPR) on The Legacy of George Carruthers on March 11, 2021: <https://www.npr.org/podcasts/475680317/the-21st>**

### RESEARCH PROPOSAL REVIEWER

**Department of Energy Office of Science Reviewer**, Office of Biological and Environmental Research (BER), 2022; and SBIR/STTR Program, Nov 2022.

**NASA Postdoctoral Program (NPP) Reviewer**, Universities Space Research Association (USRA), 2019 & 2016

**National Science Foundation (NSF)**, Arlington, VA, HBCU-UP Proposal Reviewer, 2013; Major Research Instrumentation (MRI), 2014.

**Research Corporation/Cottrell College Science Award Program**, Tucson, AZ, 2006, in the area of Laser Optogalvanic Spectroscopy

**National Science Foundation (NSF)**, Arlington, VA, 1994, 1996, 2003 & 2004, in the areas of Spectroscopy, Chemical Physics & Physical Chemistry

**Petroleum Research Fund of The American Chemical Society (ACS)**, Washington, DC, 2003, in the area of Organic Nanocrystals.

**Thomas F. & Kate Miller Jeffress Memorial Trust/Bank of America**, Commonwealth of Virginia, 1999

**National Institutes of Health (NIH)**, Department of Health and Human Services, Bethesda, MD, 1994, in the area of Biomedical Research

**Agency for International Development (AID)**, Washington, DC, 1993, in the area of Laser Optics

#### **GUEST REVIEWER/REFEREE/EDITOR FOR RESEARCH JOURNALS**

*Journal of Physical Chemistry* (1999); *Journal of Propulsion & Power* (2001); *Physica B* (2001); *Journal of Geoscience Education* (2006); *Journal of Chemical Engineering Communications* (2007); *Journal of Computer Modeling in Engineering & Sciences* (2007-08); *Journal of Lightwave Technology* (2008); *Computers, Materials & Continua* (2007-09); *Journal of Quantitative Spectroscopy & Radiative Transfer* (2009); *Journal of Molecular Structure* (2011); *Remote Sensing* (2012); *Applied Optics* (2012)

#### **PANEL MEMBERSHIPS & REVIEWER**

*Harriett Jenkins Pre-doctoral NASA Fellowship Panel* (2003)

*NASA Administrator's Fellowship/TADSBAT Panel* (2003)

*Faculty Consultant and Reader, College Board/Educational Testing Service (ETS), Princeton, New Jersey,* (2003 & 2004)

*Member of Scientific Community & Jury Panel, XXI International Conference of Young Otorhinolaryngologists, St. Petersburg, Russia,* (2004)

*Yale University Advanced Placement (AP) Physics Evaluator* (2005 - 06)

*American Society for Engineering Education (ASEE), NDSEG Panel Member & Physics Evaluator* (2007-08; 2009-10)

*Designated Howard University Representative on the Universities Space Research Association (USRA) Council of Institutions* (2009)

*ASEE-NASA Undergraduate Fellowship Program Panel* (2010)

*ASEE-ONR Summer Faculty Program Panel* (2010-12)

*NASA Aeronautics Scholarship Program Evaluation Panel* (2011)

*National Defense Science and Engineering Graduate (NDSEG) Fellowship Panel* (2011)

*NASA URC Virtual Poster Session and Symposium Judge* (2012)

*NSF Graduate Research Fellowship Program (GRFP) Reviewer - Physics 1 and Astronomy* (2012 & 2014-15) and *Physics II* (2022).

*Fulbright Specialist Program Peer Review Panel in Physics Education* (2011-13)

*Expert Judge, Toshiba/National Science Teachers Association (NSTA) ExploraVision Evaluation Panel, Regional Judges Meeting, February 23, 2014, Arlington, VA*

*NASA Postdoctoral Program (NPP) Reviewer, Universities Space Research Association (USRA)* (2019 & 2016)

*National Science Foundation (NSF) Panel Reviewer, Physics REU (November 7-8, 2022) & Division of Materials Research (DMR) REU (November 17, 2022), and Graduate Fellowship Research Program (GRFP) (November 2022-January 2023).*

*Judge, Outstanding Student Presentation Award (OSPA): Fall 2019 American Geophysical Union (AGU) Meeting, San Francisco, CA, December 9-13, 2019; Fall 2020 AGU Virtual Meeting, December 2020; Fall 2021 AGU Meeting, December 13-17, New Orleans, LA, & Online Everywhere; and Fall 2022 AGU Meeting, December 12-16, 2022, Chicago, IL, & Online Everywhere.*

*Judge, Poster Competition, AbSciCon 22, Atlanta, GA, May 15-20, 2022.*

*Reviewer for bioimaging grant proposals for Department of Energy (DOE) Office of Biological & Environmental Research, June-July 2022, & SBIR/STTR proposal, November 2022.*

*Judge, Science Montgomery, Montgomery County Science Fair, MD, March 24-26, 2023.*

*Judge for the Outstanding Student Paper Award (OSPA): reviewed and judged virtual posters and oral talks at the AGU 2022 Fall Meeting, December 12-16, 2022.*

## **PROFESSIONAL AFFILIATIONS (Past & Present)**

### *Member*

The New York Academy of Sciences (NYAS)  
American Association for the Advancement of Science (AAAS)  
American Association of University Professors (AAUP)  
American Mensa  
Society of Photo-Optical Instrumentation Engineers (SPIE)  
Sigma Pi Sigma (SPS) Honor Society  
Sigma Xi, The Scientific Research Society

### *Senior Member*

The Optical Society of America (OSA)

### *Fellow*

The American Physical Society (APS)  
American Society for Laser Medicine & Surgery (ASLMS)

### *Life Member*

Fulbright Association, Washington, D.C.

### *President*

Howard University Chapter of Sigma Xi – The Scientific Research Society (2013-14)

## **FUNDED RESEARCH PROPOSALS**

1. "DNA Repair & Genetic Regulation in *Vibrio Cholerae*", Lady Tata Memorial Trust, Bombay, India, 1979 (\$300; PI: **P. Misra**).

2. "Flash Photolysis Studies with a 10-Meter Czerny-Turner Spectrograph", The Graduate School of Arts & Sciences, The Ohio State University, Columbus, OH, 1985 (\$700; PI: **P. Misra**).
3. "Absorption of Infrared & Visible Laser Radiation by Liposomes and Organic Dyes", SDIO, The Pentagon, Medical Free Electron Laser Program, Washington, DC, 1990-91 (\$77,490; PI: **P. Misra**).
4. "Laboratory for Extraterrestrial Chemistry: A Core Facility at Howard University", Washington, DC, 1990-92 (\$55,000; PI: J. Halpern, Co-PIs: **P. Misra**, H. Okabe, J. Frye, C. Kumar, L. Klein & V. Kushawaha).
5. "Laser Spectroscopy of Alkoxy Radicals in a Supersonic Jet", Faculty Research Support Grant Program, Howard University, Washington, DC, 1989-90 (\$49,990; PI: **P. Misra**).
6. "Laser Irradiation of Liposomes containing Encapsulated & Membrane-Bound Dyes", Faculty Research Support Grant Program, Howard University, Washington, DC, 1990-91 (\$44,780; PI: **P. Misra**).
7. "Laboratory for Combustion Research", Collaborative Core Unit, Graduate School of Arts & Sciences, Howard University, Washington, DC, 1992-94 (\$20,500 for 92-93 and \$10,000 for 93-94; PI: J.N. Cannon, Co-PIs: **P. Misra**, V. Kushawaha, and R.C. Chawla).
8. "Laser Spectroscopy of Combustion Intermediates in a Supersonic Jet Expansion", Wright-Patterson Air Force Base, OH, 1990-94 (\$170,332; PI: **P. Misra**).
9. "Computer-Assisted Information Age Education for the Physics Department", Pew Charitable Trust Educational Grant through the Graduate School of Arts & Sciences, Howard University, Washington, DC, 1993-94 (\$ 26,817; PI: **P. Misra**, Co-PI: T. Hubsch).
10. "Spectroscopic Investigations of Chemical Intermediates of Environmental Significance", U.S. Environmental Protection Agency, Washington, DC, 1993-1997 (\$265,740; PI: **P. Misra**).
11. "Free Radical Spectroscopy and Kinetics in Microgravity Combustion", National Aeronautics & Space Administration, Glenn Research Center, Cleveland, OH, 1994-98 (\$362,271; PI: **P. Misra**).
12. "Center for the Study of Terrestrial and Extraterrestrial Atmospheres", National Aeronautics & Space Administration, Washington, DC, 1992-2007 (\$10.0+ Million; Director/PI: J. Gates/A.N. Thorpe/D.D. Venable, PIs: **P. Misra** et al (1992-96) & Associate PI: **P. Misra** et al (1997-2007).
13. "NASA Administrator's Fellowship Program", National Research Council, Washington, DC, 1999-2001 (\$ 217,076; PI: **P. Misra**).
14. "Conference on Lasers & Electro-Optics (CLEO)/Quantum Electronics & Laser Science (QELS), Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2002 (\$3,000; PI: **P. Misra**).
15. "Development of an Interdisciplinary Microcomputer-Based Teaching & Learning Platform to Enhance Understanding of Spectroscopy Associated with Physics & Biophysical Phenomena," Proposal to Stimulate Research on Teaching & Learning, Graduate School of Arts & Sciences, Howard University, Washington, DC, 2002 (\$2,000; PI: **P. Misra**).
16. "The 17th International Conference on High Resolution Molecular Spectroscopy," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2002 (\$3,300; PI: **P. Misra**).
17. "Conference on Physics on the Road," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2003 (\$2,400; PI: **P. Misra**).
18. "Development of an Earth & Space Science-Focused Education Program," American University & DC Space Grant Consortium, NASA, Washington, DC, 2002-04 (\$25,126; PI: **P. Misra**).
19. "Spectroscopic Investigation and Clinical Applications Related to Calcified Tissue in Teeth," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2003-04 (\$5,000; PI: **P. Misra**).
20. "Development of an Earth & Space Science-Focused Education & Research Program at Howard University," Universities Space Research Association & NASA, Washington, DC, 2004-07 (\$87,293; PI: **P. Misra**, Co-PIs: V. Morris & G. Carruthers).

21. "Earth System Science Education Modules for the Washington, DC Area," Universities Space Research Association & NASA, Washington, DC, 2005-06 (\$17,293; PI: **P. Misra**, Co-PIs: G. Carruthers, A. Adebayo & F.M. Dixon).
22. "ONR/HBEC Future Engineering Faculty Fellowship for Graduate Student Support," North Carolina A&T University/Office of Naval Research, Greensboro/Arlington, VA, 2006-present (\$76,868; PI: **P. Misra**).
23. "Integration of Multisim and LabVIEW for Physics Laboratory Courses and Undergraduate Laboratory Research," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2007-08 (\$5,000; PI: **P. Misra**).
24. "Integration of Multiphysics Modeling in the Special Topics Course in Laser Spectroscopy and in Undergraduate Research," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2008-09 (\$5,000; PI: **P. Misra**).
25. "Spectroscopy and Analytical Protocols for Organic Molecules of Relevance to the Origin of Life on Mars and Earth," NASA Astrobiology Institute Minority Institute Research Support (NAI-MIRS) Program, Tennessee State University, Nashville, TN, 2008 (\$25,000; PI: **P. Misra**).
26. "Modeling and Analysis of Rocket Plume RF-Line Emissions," Missile Defense Agency, Washington, DC, 2008-10 (\$300,000; PI: **P. Misra**).
27. "Multiphysics Modeling of RF-Line Emission Spectra of Molecular Species in Plumes and Discharges for Enhancing the Statistical Mechanics Course and Graduate Research in Molecular Spectroscopy," Fund for Academic Excellence, Office of the Provost, Howard University, Washington, DC, 2009-10 (\$4,000; PI: **P. Misra**).
28. "Fluorescence and Raman Spectroscopy of Organic Molecules of Relevance to the Spectral Library of Potential Contaminants for the Mars Science Laboratory Mission," UNCFSP-NASA, Washington, DC, 2012-13 (\$10,000; PI: **P. Misra**).
29. "Low Gravity Gas-Liquid Contactor," NASA Reduced Gravity Program, Washington, DC, 2013 (\$5,000; PI: **P. Misra**).
30. "TARGETED INFUSION GRANT: Enhancement of the Undergraduate Physics Program in the Department of Physics & Astronomy at Howard University," National Science Foundation, Arlington, VA, 2012-17 (\$330,798; PI: **P. Misra** and Co-PIs: D. Venable, G. Jenkins & B. Demoz).
31. "Acquisition of Terahertz Spectrometer for Research & Education at Howard University," Equipment/Instrumentation Program, Army Research Office, Research Triangle Park, NC, 2016-17 (\$375,000; PI: T.A. Searles, Co-Is: **P. Misra** et al.)
32. "Acquisition of a FERIE Aberration-Free Spectrometer," Research Resources and Small Equipment Program, Howard University, Washington, DC, 2017 (\$48,402; PI: T.A. Searles, Co-Is: Q. Williams, **P. Misra** et al.).
33. "PAC Involved: Engaging Students in Physics, Astronomy & Cosmology (PAC) Learning through Re-Purposing of Popular Media," National Science Foundation, Arlington, VA, 2013-15 (\$357,522; PI: I. Fotiyeva and Co-PIs: **P. Misra** et al.).
34. "Acquisition of a PET/CT Imaging Machine for STEM Research & Education at Howard University," Department of Defense (DOD) HBCU/MI Equipment/Instrumentation Program, Washington, DC, 2017-18 (\$590,869; PI: P. Wang and Co-Is: M. Mosleh, **P. Misra**, O. Bakare and Y. Wu).
35. "Dynamic Response of the Environments at Asteroids, the Moon, and moons of Mars (DREAM2)," NASA, Washington, DC, 2014-19 (Subcontract to Howard University: \$52,000; PI: W. Farrell and Co-Is: **P. Misra**, L. Bleacher et al.).

36. "Development & Optimization of Machine Learning Algorithms & Models of Relevance to START Databases (START – National Consortium for the Study of Terrorism & Responses to Terrorism, University of Maryland)," Department of Homeland Security (DHS), Washington, DC, 2015-16 (\$50,000; PI: **P. Misra**).
37. "NASA Early Opportunities Program for Underrepresented Minorities in Earth and Space Sciences," NASA, Washington, DC, 2016-20 (\$499,771; PI: **P. Misra**; Co-PI: D. Venable/Howard University), S. Hoban and B. Demoz/University of Maryland, Baltimore County, and B. Meeson/Goddard Space Flight Center).
38. "Lunar Environment And Dynamics for Exploration Research (LEADER)," NASA, Washington, DC 2019-24 (Howard University portion of the award: \$119,000; Co-I: **P. Misra** et al; PI: R. Killen/NASA Goddard Space Flight Center).
39. "MRI: Acquisition of a Physical Property Measurement System to Study Quantum, Magnetic and Functional Materials and Quantum Devices," National Science Foundation (NSF) Major Research Instrumentation (MRI) Program, Alexandria, VA, 2020-23 (\$329,735; PI: Samaresh Guchhait, Co-PIs: Kim Lewis, **Prabhakar Misra**, Tina Brower-Thomas and Tao Wei).
40. "A Materials Characterization and Testing System for Enhancing Transdisciplinary Research and Education at Howard University," Department of Defense (DoD), Defense University Research Instrumentation Program (DURIP), Air Force Office Of Scientific Research (AFOSR), 2020-21 (\$569,904; PI: Hessam Yazdani, Co-PIs: Paul Wang, Claudia C. Martin-Artieda, Jeseth Delgado Vela, Mohsen Mosleh and **Prabhakar Misra**).
41. "REU Site in Physics at Howard University," National Science Foundation, Alexandria, VA, 2014-19 (\$280,469; PI: **Prabhakar Misra** and Co-PI: Quinton Williams), 2017-21 (\$305,000; PI: **Prabhakar Misra** and Co-PI: Silvina Gatica) and 2020-24 (\$301,919; PI: **Prabhakar Misra** and Co-PIs: Silvina Gatica and Quinton Williams).
42. "Collaborative Research – Excellence in Research: Investigation of Quantum Effects in Nanostructures Through Research & Educational Partnership Between North Carolina Central University & Howard University," National Science Foundation (NSF), Arlington, VA, 2021-24 (\$300,000 – Howard University portion & \$300,000 – NCCU portion); PI: **Prabhakar Misra**, Co-PI: B. Vlahovic et al.).
43. "Raman Cube Rover (R3R) for Enabling Lunar Science and Exploration," NASA M-STAR, Washington, DC, 2021-23 (\$478,930; PI: **Prabhakar Misra**, Co-Is: S. Aslam, D. Bower, R. Garcia-Sanchez and D. Casimir).

## TEACHING EXPERIENCE

**Physical Mechanics (PHYS 182 & 183)**, Fall 2018 & Spring 2019, Fall 2020 & Spring 2021, Fall 2021 & Spring 2022, at the level of "Classical Mechanics", John R. Taylor, University Science Books, California, 2005 Edition.

**Statistical Mechanics I (216-222)**, Fall 2005, 2006, 2007, 2008, 2013, 2014, 2015, 2016, 2017 & 2019 and **Statistical Mechanics II (216-223)**, Spring 1996, 2006, 2007, 2008, 2009, 2014, 2015, 2019 & 2020, Howard University, at the level of "Statistical Mechanics", R.K. Pathria, Pergamon, New York (1994) & "Statistical Physics of Particles," M. Kardar, Cambridge University Press, New York (2007).

**Modern Physics (216-200 & 201)**, Fall 1994, Spring 1995, & Fall 2018, Howard University, at the level of "Introduction to the Structure of Matter: A Course in Modern Physics", J.J. Brehm and W.J. Mullin, John Wiley & Sons, New York (1989).

**Physics for Science & Engineering (PHYS 013)**, Spring 2010, and **(PHYS 014)**, Fall 2009, at the level of "Physics for Engineers & Scientists", H.C. Ohanian & J.T. Markert, 3<sup>rd</sup> Edition, W.W. Norton, New York (2007).

**Physics for Science & Engineering (PHYS 013)**, Spring 2006 & 2007, and **(PHYS 014)**, Fall 2005, 2006, 2008 & 2020 at the level of "Fundamentals of Physics", D. Halliday, R. Resnick & J. Walker, 7<sup>th</sup> Edition, John Wiley & Sons, New Jersey (2005), 8<sup>th</sup> Edition (2008) & 10<sup>th</sup> Edition (2015).

**Topics in Laser Spectroscopy (216-286-01)**, Fall 1997 & 2007; 216-287-01, Spring 1998 & 2008, Howard University, at the level of "Laser Spectroscopy: Basic Concepts and Instrumentation", W. Demtroder, 2nd Ed., Springer-Verlag, New York (1996).

**Classical Mechanics (216-210 & 211)**, Fall 1992-93, Fall 1996-97, & Spring 1993-95 & 1998, Howard University, at the level of "Classical Mechanics", H. Goldstein, 2nd Ed., Addison-Wesley, New York (1980).

**Graduate Seminar: Introduction to Laser Spectroscopy (216-283-03)**, Spring 1989, Spring 1990, Spring & Fall 1991, & Spring 1992, Howard University, at the level of "Laser Spectroscopy and Its Applications", L.J. Radziemski, R.W. Solarz and J.A. Paisner (Editors), John Wiley & Sons, New York (1988).

**Optics (021-176)**, Fall 1994 & Fall 1995, Howard University, at the level of "Introduction to Classical & Modern Optics", J.R. Meyer-Arendt, Prentice Hall, New Jersey, 4th Ed., 1995.

**Atomic Physics (021-190 & 191; 216-207-03)**, Fall & Spring 1988-90, Howard University, at the level of "Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles" by R. Eisberg & R. Resnick, 2nd Ed., John Wiley & Sons, New York (1985).

**General Physics for Architects (021-008-71 & 81)**, Summer 1989, Howard University, at the level of "Technical Physics" by F. Bueche, 3rd Ed., Harper & Row, New York (1985).

**General Physics Laboratory for Scientists & Engineers (021-025)**, Fall & Spring 1988-90, Spring & Fall 1991, Spring 1992, Spring 1994 & Spring 1996, Howard University, which included Modern Physics Experiments dealing with: Planck's Constant; Millikan Oil-Drop; Franck-Hertz Critical Potentials; Michelson Interferometer; Atomic Spectra; Bragg Diffraction and Radioactivity.

**General Physics Laboratory for Scientists & Engineers (021-024)**, Fall 1995-96, Howard University, which included Experiments in Electricity, Magnetism & Optics dealing with: Electric Field & Equipotentials; Capacitors, Resistors & Ohm's Law; Networks & Wheatstone Bridge; Oscillators & Oscilloscopes; Electromagnetic Induction; A.C. Circuits; Diffraction Grating; Atomic Spectra and Refraction.

**General Physics (021-001 & 002) Recitations**, Spring 1991, Fall 1993, Spring 2019 & Fall 2019, Howard University, at the level of "Physics" by J.D. Cutnell and K.W. Johnson, John Wiley & Sons, New York (1989). General Physics Lecture/Recitation/Laboratory (021-002-73 & 83), Summer 1991-93, Howard University, at the level of "Physics" by J.D. Cutnell and K.W. Johnson, John Wiley & Sons, New York (1989).

**General Physics (021-002) Recitation**, Fall 1988, Howard University, at the level of "College Physics" by R.A. Serway & J.S. Faughn, 1st Ed., Saunders College Publishing, New York (1985).

**Physics 131-133 Recitation (& Laboratory), 1981-86**, The Ohio State University, at the level of "University Physics" by F.W. Sears, M.W. Zeemansky & H.D. Young, 5th Ed.(1976) & 6th Ed.(1983), Addison-Wesley Publishing Co., Massachusetts.

**General Physics I-III Recitation (& Laboratory), 1979-81**, Carnegie-Mellon University, at the level of "University Physics" by F.W. Sears, M.W. Zeemansky & H.D. Young, 5th Ed., Addison-Wesley Publishing Co., Massachusetts (1976).

## RESEARCH EXPERIENCE

- 1) Development of an efficient Raman optical telescope system for lunar science and exploration, 2021-present.
- 2) Raman Spectroscopy and Molecular Dynamics Simulations of Nanomaterials (e.g. carbon nanotubes, pristine & functionalized graphene, tungsten oxide, tin dioxide, perovskites, etc.), 2009-present.
- 3) Spectroscopic characterization of stable molecules, free radicals, molecular ions and ionic clusters (e.g.  $I_2$  &  $NO_2$ ; alkoxy & alkylthio radicals, HCCO &  $C_5H_5$ ;  $CO^+$  &  $C_6F_6^+$ ;  $C_6F_6^+.nHe$ ) in a supersonic jet expansion employing a photolysis excimer laser and an excimer-pumped tunable dye laser; 1986-present.
- 4) Development of an organic contaminant spectral library as part of the Sample Analysis at Mars (SAM) initiative tied to the 2011 Mars Science Laboratory (MSL) mission. The library utilizes the Automated Mass Spectral Deconvolution and Identification System (AMDIS) software, a NIST/EPA/NIH Mass Spectral Library, NASA/GSFC, 2008-present. It is maintained as part of the XINA database at Goddard.
- 5) Formation and modeling of nanobubbles at the water-graphite interface; Multiscale modeling of nanostructures, 2006-present.
- 6) Detection and spectroscopic characterization of free radicals of relevance to combustion (under normal gravity and microgravity conditions) and atmospheric phenomena (e.g. alkoxy, alkylthio & aromatic radicals) in a supersonic jet expansion employing an excimer laser and Nd:YAG-pumped and excimer-pumped tunable dye lasers; 1988-present.
- 7) Optical-thermal and gravity relief testing of a telescope in support of the Vegetation Canopy Lidar (VCL) mission aimed at characterizing the three-dimensional structure of the earth, NASA/GSFC, 1999-2000.
- 8) Cavity ringdown spectroscopy measurements for determining water vapor concentrations at sub-parts-per-million level, NASA/GSFC, 1999-2000.
- 9) Development of an excimer laser-based lidar system for tropospheric ozone concentration measurements, 1999-2002.
- 10) Absorption of short-pulsed (nsec, psec) Nd:YAG laser radiation in the form of high-energy pulses by liposomes and the subsequent conversion into release of organic dye molecules (e.g. sulforhodamine & methylene-blue) either encapsulated in the internal volume or bound in the membrane bilayer of liposomes; 1990-2000.
- 11) Development of solid state laser technology for tunable laser systems in the ultraviolet using crystals activated by rare-earth ions (for example,  $LiCaAlF_6:Ce^{3+}$  and  $LiLuF_4:Ce^{3+}$ ) and a Ti:Sapphire laser for probing and characterization of free radicals in a flame environment under normal and microgravity conditions; 1994-2004.
- 12) High Resolution Molecular Spectroscopy in the ultraviolet (of  $CO^+$  &  $NCO$ ) employing Czerny-Turner Spectrographs (1981-86) and in the infrared (of  $NH_3$ ,  $HCl$ ,  $NO$  &  $SO_2$ ) employing a Fourier Transform Spectrometer (1981-present).

## STUDENTS, RESEARCH ASSOCIATES & POSTDOCTORAL FELLOWS SUPERVISED

1. **Jason Michael** (Undergraduate Student: Physics Major). Supported Full Time During Summer 1990 on Funded Research Project: "Absorption of Infrared & Visible Laser Radiation by Liposomes & Organic Dyes" (SDIO, The Pentagon, 1990-91).
2. **LaTonya J. Pegues** (Undergraduate Student: Physics Major). Honors Thesis: "Photoinduced Release of Organic Dyes from Liposomes" (**Graduated Spring 1992**).
3. **Michael A. Holt** (Undergraduate Student: Physics Major). Supported Full Time During Summer 1992 by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". Research Project: "Controlled Release of Dyes from Liposomes" (**Graduated Spring 1996**).

4. **Kristi C. White** (Undergraduate Student: Chemical Eng. Major). Supported Half-Time During the Academic Year (1993-95) and Full Time During Summers by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". Research Project: "FTIR Studies of Precursors for Organic Radicals".
5. **Rafiu A. Abina** (Undergraduate Student: Mechanical Eng. Major). Supported Full Time Summers 94-96 and Half-Time During the Academic Year (1994-97) by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". Research Project: "FTIR Spectroscopy of Nitrogen Dioxide and Nitric Acid".
6. **Carron Sandifor** (Undergraduate Student: Computer Science Major). Supported Full Time During Summers 94-96 & Half-time During the Academic Year (1994-96) by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". Research Project: "Lifetime and Chemical Kinetics Studies Involving the Methoxy Radical". (**Graduated Spring 1998**).
7. **John Jordan** (Undergraduate Student: Electrical Engineering Major). Supported Full Time During Summer 96 & Half-Time During the Academic Year (1996-97) by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". Research Project: "FTIR Spectroscopy of Trace Atmospheric Molecular Species" (**Graduated Spring 1998**).
8. **Dr. Abdullahi H. Nur** (Graduate Student: Physics). M.S. Thesis : "LIF Spectroscopy of the Hydroxyl and Methoxy Radicals" (**Graduated Fall 91**). His **Ph.D. Dissertation** was on "Laser Optogalvanic Spectroscopy and Laser-Induced Chemical Kinetics Studies Pertaining to the Methoxy Radical" (**Graduated Fall 1994**). He was supported as a **Postdoctoral** Research Associate (Jan-Aug, 1995). He was employed as a **Faculty Member** in the Department of Mathematics, Physics & Computer Science at Virginia Union University, Richmond, VA.
9. **Hosie L. Bryant** (Graduate Student: Physics). Supported Full Time During the Calendar Years (1993-95). Research Project: "Spectroscopy of Jet-Cooled Chemical Intermediates of Importance to Atmospheric & Combustion Phenomena".
10. **Dr. Michael King** (Graduate Student: Physics). **Ph.D. Dissertation**: "Laser Spectroscopy and Chemical Kinetics Investigations of the Methoxy Radical" (**Graduated Fall 96**). He is employed as a Research Scientist with Microelectronics Research Laboratory, Columbia, MD.
11. **Mohammed M. Kamal** (Graduate Student: Physics). M.S. Thesis: "FT-IR Spectroscopy and High Resolution Laser Spectroscopy Associated with Alkoxy and Alkylthio Radicals" (**Graduated Fall 94**). He is employed as a Senior Programmer with SAIC, VA.
12. **Abdullahi Aw-Musse** (Graduate Student: Physics). M.S. Thesis: "Fourier Transform Infrared (FT-IR) Spectroscopy of Trace Gases HCl and NO of Relevance to Atmospheric Phenomena" (**Graduated Summer 1997**). He is employed as a Patent Examiner with the U.S. Patent and Trademark Office, Arlington, VA.
13. **Dr. Edward H. Dowdye, Jr.** (Graduate Student: Physics). **Ph.D. Dissertation**: "FT-IR Spectroscopic Assessment of Gas-Phase Absorption of Atmospheric Molecular Species at Low Concentrations and their Associated Adsorption Effects on Various Material Surfaces" (**Graduated Spring 2000**). He was employed (now retired) as a Civil Servant/ Research Scientist at NASA Goddard Space Flight Center, Greenbelt, MD.
14. **Dr. Helen Major** (Graduate Student: Physics). **Ph.D. Dissertation**: "Investigation of the Time-Resolved Laser Optogalvanic Waveforms of Argon and Neon and their Usefulness in the Analysis of Direct Current Plasmas" (**Graduated Summer 2000**). She was employed as an Associate Professor of Physics at Lincoln University, PA.
15. **Xinming Zhu** (Research Associate); Supported Full Time (1991-95) on Funded Research Projects: "Laser Spectroscopy of Combustion Intermediates in a Supersonic Jet Expansion" (Wright-Patterson Air Force Base, 1990-93); "Spectroscopic Investigations of Chemical Intermediates of Environmental Significance" (Environmental Protection Agency, 1993-96) and by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres". He is currently employed as an **Optical Engineer** with Continuum in Santa Clara, CA.

16. **Dr. Mark A. Dubinskiy** (Senior Research Scientist); Supported Full Time on Funded Research Project: "Free Radical Spectroscopy & Kinetics in Microgravity Combustion" (NASA Glenn Research Center, 1994-96). After working as a Senior Visiting Scientist at the USAF Wright Laboratory in the Electro-Optics Laser Applications Branch, Dayton, OH, he is currently employed as a Group Leader/Research Scientist with Army Research Laboratory, MD.
17. **Dr. Y.-B. (Bruce) She** (Senior Research Associate); Supported Full Time on Funded Research Project: "Free Radical Spectroscopy & Kinetics in Microgravity Combustion" (NASA Glenn Research Center, 1996-98).
18. **Dr. Chandran Haridas** (Postdoctoral Fellow); Supported Full Time on Funded Research Project: "Spectroscopic Investigations of Chemical Intermediates of Environmental Significance" (Environmental Protection Agency, 1996-97) & NASA Glenn grant (1997-98). He worked as a Lecturer III in the Department of Physics and Astronomy, Howard University, for the 1998-99 and 1999-2000 Academic Years. He is teaching high school physics in the West Virginia Public School System.
19. **Lawrence Wilson** (Undergraduate Student:) Supported Full Time by the NASA "Center for the Study of Terrestrial & Extraterrestrial Atmospheres" for the "FT-IR Spectroscopy of Trace Atmospheric Species" (1998-99). (**Graduated Fall 2000**).
20. **Jonah Flowers** (Undergraduate Summer Student) Supported by CHARC/CSTEA Program and worked on the "FT-IR Spectroscopy of Trace Amounts of Sulfur Dioxide" (1998).
21. **Kolin Newsome** (Undergraduate Summer Student) Supported by CHARC/CSTEA Program and worked on the "Accurate Concentration Estimates of Sulfur Dioxide Using FT-IR Spectroscopy and Exploratory LabVIEW Programming for Atmospheric Measurements" (1999).
22. **Girum Gugsu** (Research Associate, 1998-present) Supported by the Universities Space Research Association (USRA)-Earth System Science Education for the 21st Century (ESSE 21)-sponsored project "Development of an Earth & Space Science-Focused Education & Research Program at Howard University." Girum worked on uploading and updating the ESSE 21-related web site for the above-cited project. He was also involved in developing and upgrading the main web site for the Laser Spectroscopy Laboratory. After working at the NASA Goddard Space Flight Center, he is now employed with SAIC.
23. **LeVatrice Nora** (Graduate Student: Physics) Supported full-time by the *Center for the Study of Terrestrial & Extraterrestrial Atmospheres (CSTEA)* and performed M.S. research on Laser Optogalvanic Spectroscopy of Neon & Argon Transitions and Optical Spectroscopy of Dental Enamel (**Graduated Spring 2004**). She is a teacher in the Prince Georges County Public Schools system, Maryland.
24. **Vasant Venu** (Undergraduate Student from University of Maryland Baltimore County) Supported on the NASA-USRA Earth & Space Science project (2005-06). He co-developed the website for the *Laser Spectroscopy Laboratory* (<http://www.physics1.howard.edu/~pmisra/Research.html>).
25. **Obafemi Otelaja** (Undergraduate EE Student) Supported on the Howard University Student Employment Program (2006-07). He investigated optogalvanic transitions using an iron-neon hollow cathode lamp and a Nd:YAG-pumped tunable dye laser.
26. **Cyril Acholo** (Undergraduate Computer Engineering Student) Research Volunteer who worked on applying laser spectroscopy to atomic and molecular transitions using the Nd:YAG-pumped tunable dye laser system (2006-07).
27. **Cristin Chall** (Undergraduate Physics Major) Supported on the NASA-USRA Earth & Space Science Project (2005-06). His research project focused on applying LabVIEW to spectral data acquisition in the *Laser Spectroscopy Laboratory*.
28. **Dr. Angelina Amadou** (Graduate Student: Physics) Supported on a Graduate Teaching Assistantship by the Department of Physics & Astronomy/Graduate School of Arts & Sciences. **Ph.D. Dissertation** (Co-Advisor: Dr. V. Morris/Chemistry): "Microphysical & Optical Properties of Organic Aerosols & Their Relevance

to Cloud Condensation Nuclei” (**Graduated Spring 2006**). She served as a **Postdoctoral Fellow** in the *Laser Spectroscopy Laboratory* & as a Lecturer in the Department of Physics & Astronomy (2006-08 & 2014-15).

29. **Dr. Johnny Batts** (Graduate Student: Physics) Supported full-time by the *Center for the Study of Terrestrial & Extraterrestrial Atmospheres (CSTEA)*. **Ph.D. Dissertation** (Co-Advisor with Dr. J. Halpern/Chemistry) “Spectroscopic Measurements of the Concentration of Atmospheric Formaldehyde (CH<sub>2</sub>O) in Beltsville, Maryland” (**Graduated Summer 2006**).

30. **Dr. Ogungbemi Kayode** (Graduate Student: Physics) Supported on a Graduate Teaching Assistantship by the Department of Physics & Astronomy/Graduate School of Arts & Sciences and as a Graduate Research Assistant on a Missile Defense Agency (MDA) funded grant. He pursued a **Ph.D. Dissertation** “Laser Optogalvanic Spectroscopy of Discharge Plasmas and Modeling & Analysis of Rocket Plume RF-Line Emissions” (**Graduated Spring 2010**). He continued as a **Postdoctoral Research Associate** on the MDA-funded project (2010) and then as a Lecturer in the Department of Physics & Astronomy (2010-11).

31. **Dr. Tania De** (Graduate Student: Physics) Supported on a Graduate Teaching Assistantship by the Department of Physics & Astronomy/Graduate School of Arts & Sciences. M.S. Thesis: “Spectroscopy of Normal & Diseased Teeth” (**Received M.S. in Spring 2006**). Tania continued with her **Ph.D. Dissertation**: “Retrospective Radiation Dosimetry Study of Human Teeth, Bone and Finger Nail Using Electron Paramagnetic Resonance” (**Graduated Spring 2011**). She is currently an Associate Professor in Montgomery College, MD.

32. **Dr. Tariq Ahmido** (Graduate Student: Physics) Supported on an ONR/HBEC Fellowship (2006-08) & Naval Research Laboratory (2008-11). **Ph.D. Dissertation** (in collaboration with Dr. A. Ting of NRL) “Remote Sensing of Explosive Surrogates Using Ultrashort Laser Induced Breakdown Spectroscopy” (**Graduated Spring 2011**). He is currently a postdoctoral fellow at Johns Applied Physics Laboratory, Laurel, MD.

33. **Ryan O’Donnell** (Undergraduate Physics Major) Worked on the Microgravity Project “Low Gravity Gas-Liquid Contactor,” funded by the NASA Reduced Gravity Program, 2013.

34. **Dr. Daniel Casimir** (Graduate Student: Physics) Supported on NSF AGEP & Sloan Fellowships. **Ph.D. Dissertation**: “Investigation of Thermal Expansion Properties of Single Walled Carbon Nanotubes by Raman Spectroscopy and Molecular Dynamics Simulation” (**Graduated Spring 2015**). He is currently a Lecturer in the Department of Physics & Astronomy at Howard University.

35. **Dr. Raul Garcia-Sanchez** (Graduate Student: Physics) Supported on an NSF AGEP Fellowship. He has worked on the “Development of the Organic Contaminants Spectral Database for the ongoing (2012-present) NASA Mars Science Laboratory (MSL) Mission”. **Ph.D. Dissertation**: “Characterization of Metal Oxide Gas Sensors Using Raman Spectroscopy and Computer Simulations” (**Graduated Spring 2016**). He is currently a Media Specialist in the Department of Physics & Astronomy at Howard University.

36. **Kenisha Ford** (Graduate Student: Physics) Supported by a Graduate Teaching Assistantship. Her research involves “LAMMPS- Driven Molecular Dynamics Simulation Studies of Single Walled Carbon Nanotubes at Different Temperatures” (2012-13).

37. **Janelle Holmes** (Undergraduate Physics Major) Involved in research focused on the “Antistokes Raman Spectroscopy of Single Walled Carbon Nanotubes” (2012-13) and “Solar Storms and Lunar South Pole Space Weather” (with Mentor: W. Farrell/GSFC, 2014-present). Supported on NSF HBCU-UP and DREAM 2 grants. **Graduated Spring 2016**. Currently pursuing a Ph.D. in Applied Physics at the University of Michigan.

38. **Keenan Hunt-Stone** (Undergraduate Physics Major) Involved in NASA DREAM2 Project (with Mentor: Timothy Stubbs/GSFC) “Using Apollo Data to Characterize the Lunar Environment” (2015-16) and worked on a Targeted Infusion Project to Develop a Hybrid General Astronomy Course (with Instructor: D. Venable) Using the Howard University Planetarium & Observatory (2012-16). Supported on NSF HBCU-UP & NASA DREAM 2 grants. **Graduated Spring 2017**. Currently pursuing a Ph.D. in Applied Physics at the University of Michigan.

39. **Naomi Haddock** (Undergraduate Physics Major) Worked on PASCO physics software package to understand how gravity and friction affect the dynamics of motion and collisions between bodies on impact with the ultimate aim of understanding the effects of microgravity (2014-15). Supported on NSF HBCU-UP grant. **Graduated Spring 2018.**
40. **Iman Ahmed** (Undergraduate Physics Major) Performing Scanning Electron Microscope (SEM) & Raman Spectroscopy measurements on graphene nanoplatelets (2016-19). Supported on NSF HBCU-UP and NASA DREAM 2 grants. Her honors thesis was titled “Characterization of Functionalized Graphene Nanoplatelets Using Scanning Electron Microscopy and Raman Spectroscopy.” **Graduated Spring 2019.**
41. **Kyia Rutherford** (Undergraduate Physics Major) Engaged in bringing up to speed a Fourier Transform Infrared (FTIR) spectrometer to characterize nanomaterials in the mid-infrared to complement the Raman spectroscopy measurements (2014-15). Supported on NSF HBCU-UP grant. **Graduated Spring 2020.**
42. **John Clark**, Mechanical Engineering major (NASA Research Mentor: Dr. John Cooper, GSFC Code 672): “Energetic Radiation Environment at Mars and Phobos”. Supported and co-mentored on NASA MOO-Howard University grant.
43. **Sirak Fessehaye**, Physics major (NASA Research Mentor: Dr. Timothy Stubbs, GSFC Code 695): “Investigating the Plasma Environment at the Moon”. Supported and co-mentored on NASA MOO-Howard University grant
44. **Trey Jean-Baptiste**, Physics major (NASA Research Mentor: Dr. Ricardo Arevalo, GSFC 699): “Nontraditional Elemental Proxies for Redox”. Supported and co-mentored on NASA MOO-Howard University grant.
45. **Zahraa Lopez**, Computer Science major (NASA Research Mentor: Dr. Rosemary Killen, GSFC Code 695): “Sodium Exosphere of the Moon”. Supported and co-mentored on NASA MOO-Howard University grant.
46. **Skylar Grammas**, Computer Science major (NASA Research Mentor: Dr. William Farrell, GSFC Code 695): “Cassini Proximal Orbit Data Analysis” and “Development of Visualization Tools in Support of the DSX Tri-Axial Search Coil”. Supported and co-mentored on NASA MOO-Howard University grant.
47. **Nikolas Rassoules**, Electrical Engineering/Computer Science major (NASA Research Mentor: Dr. Michael Collier, GSFC Code 695): “Plasma Conditions on and Near the Moon”. Supported and co-mentored on NASA MOO-Howard University grant.
48. **Marla Brown**, Computer Science major (NASA Research Mentor: Dr. Michael Collier, GSFC Code 695): “Characteristics of Plasma Regions Traversed by the Moon”. Marla is examining Apollo-era and modern-day particle and field data to infer properties of the Moon's interaction with the space environment. Supported and co-mentored on NASA MOO-Howard University grant.
49. **James Johnson**, Civil Engineering major (NASA Research Mentor: Dr. Alexander Pavlov, GSFC Code 699): “Formation of Gas Traps in the Martian Regolith”. Discovery of methane (CH<sub>4</sub>) on Mars implies that Mars may have an active biosphere. James has examined the hypothesis that methane is trapped below the Martian salty-soil permafrost layer and is released during the seasonal pressure/temperature oscillations observed on Mars. He used the Martian Simulation Chamber to test this hypothesis. Supported and co-mentored on NASA MOO-Howard University grant. **Expected Graduation Spring 2021.**
50. **Irima Ajang**, Biology/Sports Medicine major, worked on “Remote Observations of the Lunar Sodium Corona” (NASA Research Mentor: Dr. Rosemary Killen/Code 695). Supported and co-mentored on NASA MOO-Howard University grant. **Graduated Spring 2020.**
51. **Elijah Catalan**, Biology & Environmental Science Double major, worked on “Modeling Neon Distribution in the Lunar Exosphere” (NASA Research Mentor: Dr. Orenthal Tucker/Code 695). Supported and co-mentored on NASA MOO-Howard University grant. **Graduated Spring 2020.** He is pursuing a Ph.D. in the Institute of Environment & Sustainability at UCLA.

52. **Essien Taylor**, Computer Engineering major, worked on “Analysis of Magnetopause Models Using Observed Magnetopause Crossings” (NASA Research Mentor: Dr. Michael Collier/Code 673). Supported and co-mentored on NASA MOO-Howard University grant.
53. **Ajani Smith-Washington** (Undergraduate Physics Major) Engaged in Raman Spectroscopy and Machine Learning Characterization of Functionalized Graphene Nanoplatelets (2017-present), and “Remote Sensing Observations of the Lunar Sodium Corona” (2019-present; with Research Mentor Rosemary Killen at NASA Goddard). Supported and co-mentored on NASA DREAM 2 and LEADER projects. **Graduated Spring 2021.**
54. **Robert Coleman, Jr.** (Undergraduate Computer Engineering Major) Engaged in Raman and Infrared Spectroscopy and Machine Learning Algorithms Associated with Large Spectral Datasets Associated with Lunar Analog Minerals (2019-present; Supported and co-mentored on NASA DREAM2 & ROSES projects). **Graduation Spring 2021.**
55. **Jasmine Verette** (Undergraduate Physics Major) Involved in the project Raman spectroscopy and modeling and simulation of perovskite samples. Supported on NSF Excellence in Research Project (EiR), (2021-present; **Expected Graduation: Spring 2025**).
56. **Ananda Nole** (Undergraduate Mechanical Engineering Major) Engaged in spectroscopic characterization of carbon quantum dots. Supported on NSF Excellence in Research Project (EiR) (2021, **Expected Graduation: Spring 2023**).
57. **Nicolette Johnson** (Undergraduate Physics Major) Focused on the physics of graphitic nanomaterials. Supported on NSF Excellence in Research Project (EiR) (2021, **Expected Graduation: Spring 2025**).
58. **Chelsea Jordan Clemetson** (Undergraduate Physics Major) Involved in the research project Raman spectroscopy and simulation of quantum dot nanostructures. Supported on the NSF Excellence in Research (EiR) Grant (2022-present, **Expected Graduation: Spring 2026**).
59. **Yaman Siwakoti** (Undergraduate Mechanical Engineering Major) Engaged in UV-VIS and Raman spectroscopy of minerals and quantum dot molecules. Supported on the NSF Excellence in Research (EiR) Grant (2022-present, **Expected Graduation: Spring 2024**).
60. **Jonathan Greer** (Undergraduate Physics Major) Engaged in Optimization & Construction of an Efficient Raman Optical System for Lunar Exploration. Supported on the NASA Raman Cube Rover (R3R) project, (2021-present; **Expected Graduation: Spring 2025**).
61. **Autumn Edwards** (Undergraduate Computer Engineering Major) Involved in Computer-Aided Design of a Raman Cube Rover for Lunar Science Applications. Supported on the NASA Raman Cube Rover (R3R) project, (2021-present, **Expected Graduation Spring 2024**).
58. **Olasunbo Farinre** (Graduate Student: Physics) Supported on Graduate Teaching Assistantship. **Ph.D. Dissertation:** “Spectroscopic Characterization and Computational Study of Pristine and Functionalized Graphene Nanoplatelets,” (2018-2022; **Graduated Spring 2022**).
62. **Hawazin Alghamdi** (Graduate Student: Physics) Supported on Graduate Teaching Assistantship. **Ph.D. Dissertation** (Co-Advisor with Dr. Silvina Gatica): “Temperature-Dependent Spectroscopic Characterization and Computational Study of Tin Dioxide for Gas-Sensing Applications,” (2018-2023; **Graduated: Spring 2023**).
63. **LaRay Hare** (Graduate Student: Physics) Supported on the NASA Raman Cube Rover (R3R) project. **Ph.D. Dissertation:** Raman Cube Rover (R3R) for Enabling Lunar Science and Exploration. Supported on the NASA Raman Cube Rover (R3R) project, (2021-present; **Expected Graduation: Spring 2025**).
64. **Nathan Roseboro** (Undergraduate Mechanical Engineering Major) Engaged in Designing an Optimal Raman Spectroscopy System Using a Long-distance Microscope for Lunar Exploration. Supported on the NASA Raman Cube Rover (R3R) project, (2022-present, **Expected Graduation Spring 2024**).

65. **Malaya Moon** (Undergraduate Computer Engineering Major) Involved in designing an enclosure and setting up an efficient optical collection system for the Raman Cube Rover project. Supported on the NASA Raman Cube Rover (R3R) project, (2022-present, **Expected Graduation: Spring 2023**).
66. **Miles Phillips** (Undergraduate Mechanical Engineering Major) Engaged in optimizing the signal for standoff Raman spectroscopy in the laboratory for the Raman Cube Rover (R3R) using the Questar long-distance microscope, (2023-present, **Expected Graduation: Spring 2024**).
69. **Gloria Dagrín** (Undergraduate Computer Science Major) Involved in 3D printing of components and refining and automating the optical configurations for standoff Raman spectroscopy. Supported on the NASA Raman Cube Rover (R3R) project, (2023-present, **Expected Graduation: Spring 2026**).
70. **Anverly Jones** (Undergraduate: Computer Science Major) Involved in optimizing and recording Raman spectra from lunar analog minerals using 1 m and 10 m optical fibers. Supported on the NASA Raman Cube Rover (R3R) project, (2023-present, **Expected Graduation: Spring 2026**).

### **Research Experiences for Undergraduates (REU) Site in Physics at Howard University Students Mentored**

67. **Larkin Sayre** (MIT, MA), "Raman spectroscopy and COMSOL Multiphysics simulation studies of tungsten oxide ( $WO_3$ ) as a potential metal-oxide gas sensor (MOGS)," REU 2014.
68. **Sarah Bartley** (Agnes Scott College, GA), "Gas sensing properties of the adsorption of NO on  $WO_3$  cubic structures," REU 2015.
69. **Christina Craig** (University of Dallas, TX), "Raman spectroscopy of tungsten oxide," REU 2015.
70. **Grant Cates** (Linfield College, OR), "Functionalizing graphene with ZnO nanowires with an eye towards gas-sensing applications," REU 2016.
71. **Fabiola Diaz** (Francis Marion University, SC), "Characterization of tungsten (IV) oxide, tin dioxide and graphene using Raman spectroscopy for gas-sensing applications," REU 2017.
72. **Evan Folk** (University of Nebraska at Kearney, NE), "Nanophysics: Characterization and theory," REU 2017.
73. **Marianne Peterson** (St. Olaf College, MN), "Spectral analysis of analog Martian and lunar mineral samples: anorthite, augite, bytownite and labradorite," REU 2018.
74. **Madison Howard** (Morehead State University, KY), Spectral analysis of analog Martian and lunar mineral samples: olivine, ilmenite and apatite," REU 2018.
75. **Benjamin Concepcion** (George Mason University, VA), "Spectroscopic characterization of tetragonal tin dioxide," REU 2019.
76. **Lia Phillips** (Appalachian State University, NC), "Characterization and computational simulation of graphitic nanomaterials," REU 2019.
77. **Reiley Dorrian** (Cornell University, NY), "Measuring phonon structure of carboxyl-functionalized graphene nanoplatelets and rutile tin dioxide through Molecular Dynamics simulations," REU 2021.
78. **Yoshinobu Fujikake** (Illinois Institute of Technology, IL), "Experimental data and analysis of spinel/perovskite composites using Raman spectroscopy," REU 2022.
79. **Nigel Krekeler** (The Ohio State University, OH), "Modeling and simulation of spinel/perovskite composites using Raman spectroscopy," REU 2022.

### **COMPLETE LIST OF RESEARCH PRESENTATIONS & PUBLICATIONS OF PRABHAKAR MISRA**

1. "Analysis of the  $\nu_1 + \nu_2$  and  $\nu_1 + \nu_2 - \nu_2$  Bands of  $^{14}NH_3$  and  $^{15}NH_3$ ", S. Urban, **P. Misra**, R. D'Cunha and K.N. Rao, Paper RE13, 39th International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1984.

2. "Performance of a 300 grooves/mm, 20 cm x 40 cm Bausch & Lomb Plane Grating in a 10-M Czerny-Turner System Operating in the UV Region", C.W. Mathews, B. Hare, **P. Misra**, M. St. Clair, E. Williams, Jr. and K.N. Rao, Paper RC10, 39th International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1984.
3. "Vibration-Rotation Bands of Ammonia", **P. Misra**, Department of Physics, The Ohio State University, Columbus, OH, May 1985.
4. "The B  $2\Sigma^+-X\ 2\Sigma^+$  System of  $^{12}\text{C}^{16}\text{O}^+$  and  $^{13}\text{C}^{16}\text{O}^+$ ", **P. Misra**, C.W. Mathews, D.W. Ferguson and K.N. Rao, Paper MF11, 41st International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1986.
5. "Laser Induced Fluorescence Spectrum of Cold Methoxy Radical", S.C. Foster, X. Liu, **Prabhakar Misra**, L. Yu, C.P. Damo and T.A. Miller, Paper RA1, 42nd International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1987.
6. "Laser Spectroscopy of Free Radicals in a Supersonic Jet", **P. Misra**, Department of Physics & Astronomy, Howard University, Washington, DC, May 1988.
7. "Laser Excitation and Dispersed Fluorescence Spectra of Methoxy Produced by Photodissociation in a Pulsed Supersonic Jet Expansion", S.C. Foster, **Prabhakar Misra**, T.-Y. Lin, C.P. Damo, C.C. Carter and T.A. Miller, 43rd International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1988.
8. "Rotational Analysis of the A  $^2A - X\ ^2E$  Transition of  $\text{CH}_3\text{O}$  and  $\text{CH}_3\text{S}^+$ ", X. Liu, **Prabhakar Misra**, S.C. Foster, C.P. Damo, T.-Y. Lin and T.A. Miller, Paper TG13, 43rd International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1988.
9. "Excitation and Dispersed Fluorescence Spectra of the Ethoxy Free Radical", S.C. Foster, **Prabhakar Misra**, T.-Y. Lin, C.P. Damo, C.C. Carter and T.A. Miller, Paper MG3, 43rd International Molecular Spectroscopy Symposium Abstracts, Columbus, OH, June 1988.
10. "Laser-Induced Fluorescence Spectroscopy in a Free Jet", Department of Physics, James Madison University, Harrisonburg, VA, June 1988, Invited Talk.
11. "Free-Jet Cooled Laser Spectroscopy of Transient Molecules", Department of Physics, Howard University, Washington, DC, October 1988, Invited Talk.
12. "Laser Spectroscopy: A Probe Into the Private World of Atoms & Molecules", Society of Physics Students, Howard University Chapter, American Physical Society (APS), April 1990, Invited Talk.
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21. "Supersonic Jets and Excimer Lasers: A Stable Marriage for the Study of Unstable Free Radicals", **Prabhakar Misra**, Colloquium, Department of Physics & Astronomy, Howard University, Washington, D.C., February 1993.
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23. "High Resolution Laser Induced Fluorescence Spectroscopy of the CH<sub>3</sub>O and CH<sub>3</sub>S Radicals", Mohammed M. Kamal and **Prabhakar Misra**, Paper 80, Graduate Research Symposium, Howard University, Washington, D.C., April 1993.
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25. "Time-Resolved Fluorescence Spectra of Dye-Liposome Complexes", Fazla Rabbi B. Hossain and **Prabhakar Misra**, Paper 79, Graduate Research Symposium, Howard University, Washington, D.C., April 1993.
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31. "Lasers and Liposomes: A Successful Marriage for Dye Release and Drug Delivery", Michael A. Holt and **Prabhakar Misra**, Graduate Research Symposium, Paper 94, Howard University, Washington, D.C., April 1994.
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183. "REU in Physics at Howard University," **P. Misra**, T. Hubsch, D. Venable, S. Gatica, K. Stancil, B. Demoz, G. Jenkins, 2014 MRS Fall Meeting & Exhibit, Boston Massachusetts, November 30 - December 5, 2014.
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  187. "Investigations of Thermal Properties of Carbon Nanotubes and Metal Oxide Nanomaterials Using Raman Spectroscopy and Molecular Dynamics Simulations," **P. Misra**, Invited talk at the Tata Institute of Fundamental Research, Colaba, Mumbai, India, February 3, 2015.
  188. "Characterization of Nanomaterials Relevant to Energy Storage and Gas Sensing Applications Using Raman Spectroscopy & Molecular Dynamics Simulations," **P. Misra**, D. Casimir, R. Garcia-Sanchez. Invited talk at IC-EEE 2015 Conference held February 4-7, 2015 in Cochin, India.
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  190. "Raman Spectroscopic Characterization of Carbon Nanotubes & Tungsten Oxide of Relevance to Energy Storage and Gas Sensing Applications," **P. Misra**, D. Casimir, R. Garcia-Sanchez and S. Baliga. TechConnect 2015 Meeting held June 14-17, 2015 in National Harbor, MD.
  191. "Raman spectroscopy and molecular simulation studies of graphitic nanomaterials," D. Casimir, R. Garcia-Sanchez and **P. Misra**, in Modeling, Characterization and Production of Nanomaterials: Electronic, Photonics and Energy Applications, Vinod K. Tewary and Yong Zhang (Editors), Woodhead Publishing Series in Electronic and Optical materials, Number 73, Elsevier Ltd., Cambridge, UK, ISBN: 978-1-78242-228-0, 2015, pp. 179-199.
  192. "Application, Hiring & Tenure Process for New University Faculty," **P. Misra**, Invited Talk, *Apply for Faculty Positions Seminar Series*, Organized by the National Institute of Standards & Technology (NIST) PostDoc Association, NIST, Gaithersburg, MD, August 20, 2015.
  193. "Rayleigh-Plateau Instability of a Water Column aboard 'The Vomit Comet!'" **P. Misra**, Breakfast & Learn Series Invited Talk, Planetary Environments Laboratory/Code 699, NASA Goddard Space Flight Center, October 6, 2015.
  194. "Investigation of the Thermal Behavior of Single-Walled Carbon Nanotubes and Tungsten Oxide Nanostructures Using Raman Spectroscopy," **Prabhakar Misra**, Daniel Casimir, Raul Garcia-Sanchez, Christina Craig, Sarah Bartley, and Shankar Baliga, APS March Meeting, Paper S27.00004, Session S27: Carbon Nanotube & Related Materials: Thermal, Mechanical & Other Properties, Baltimore, MD, March 14-18, 2016.

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196. "Low Gravity Gas-Liquid Contactor: Effects of Reduced and Zero Gravity on Rayleigh-Plateau Instability," Raul Garcia-Sanchez, Janelle Holmes, Ajamu Abdullah, Aara'L Yarber, Ryan O'Donnell, **Prabhakar Misra**, and Bradley Carpenter, *International Journal of Advanced Research in Physical Science (IJARPS)*, Vol. 4, Issue 2, pp. 28-36, February 2017, ISSN 2349-7874 (Print) & ISSN 2349-7882 (Online).
197. "Rayleigh-Plateau Instability of a Water Column Aboard 'The Vomit Comet!'" **Prabhakar Misra** and Raul Garcia-Sanchez, Hyperwall Talk, Thursday, December 14, 2017, American Geophysical Union (AGU) 2017 Meeting, New Orleans, LA.
198. "Raman Spectroscopy of Graphitic Nanomaterials," Invited Plenary Talk, **Prabhakar Misra**, 1<sup>st</sup> North Indian Science Congress, NISC-2018 & International Conference on *Science and Technology for Sustainable Future*, B.B. Ambedkar University, Lucknow, India, January 10-11, 2018.
199. "Highlighting the Successes of the NASA MOO-Howard University Project," **Prabhakar Misra**, Poster presentation, Annual Sciences & Exploration Directorate (SED/Code 600) Poster Party, NASA Goddard, Bldg 28 Atrium, January 30, 2018.
200. "Research Opportunities for Underrepresented Students in Earth & Space Sciences," **Prabhakar Misra**, Susan Hoban, Belay Demoz, Blanche Meeson and Willam Farrell, Poster PST2B02 Presentation, American Association of Physics Teachers (AAPT) Meeting, Washington, DC, July 28-August 1, 2018.
201. "Lessons Learned from REU Site in Physics at Howard University," **Prabhakar Misra**, Silvina Gatica, Quinton Williams, Pratibha Dev, and Thomas Searles, Contributed Oral Presentation DL12, American Association of Physics Teachers (AAPT) Meeting, Washington, DC, July 28-August 1, 2018.
202. "REU Site in Physics at Howard University," **P. Misra**, S. Gatica, Q. Williams, P. Dev and T. Searles, Poster Presentation, American Geophysical Union (AGU) 2018 Meeting, Washington, DC, December 10-14, 2018.
203. "Lessons Learned from the NASA MOO Howard University Program for Underrepresented Minorities in Earth & Space Sciences," **P. Misra**, W. Farrell, B. Meeson, S. Hoban, B. Demoz, and R. Sakai, Oral presentation, American Geophysical Union (AGU) 2018 Meeting, Washington, DC, December 10-14, 2018.
204. "Raman Spectroscopy of Graphitic Nanomaterials," Daniel Casimir, Iman Ahmed, Raul Garcia-Sanchez, **Prabhakar Misra**, and Fabiola Diaz, Chapter in *Raman Spectroscopy*, Gustavo M. do Nascimento (ed.), InTechOpen, London, England Open access online: <http://www.intechopen.com>. Published (2018), <http://dx.doi.org/10.5772/intechopen.72769>
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