Dipankar Sen, MS

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Education

PhD in Physics **Expected Spring 2025**
Texas A&M University, College Station, Texas, USA *GPA: 4.0/4.0*

MS in Physics **May 2019**
Indian Institute of Science Education and research, Bhopal, India *GPA: 9.87/10.0*

BSc (honors) in Physics **July 2016**
University of Burdwan, West Bengal, India *Percentage: 71.13%*

Research Experience

Graduate Assistant, Texas A&M University August 2019-till date

- Currently working on an interdisciplinary project using fluorescence confocal microscopy to perform in-vivo temperature sensing using rare-earth element based upconversion nanoparticles.
- Worked to improve resolution and depth of focus of Optical Coherence Microscopy and performed non-invasive imaging of sorghum grains leading to 2 peer-reviewed publications and 4 peer-reviewed conference proceedings.
- Used Raman spectroscopy techniques to inspect starch and nitrate concentrations in arabidopsis seedlings and corn plants leading to 2 peer-reviewed publications and 4 peer-reviewed conference proceedings.

Graduate Research Assistant, Los Alamos National Laboratory May 2024-August 2024

- Worked on building a reflection mode non-degenerate infrared quantum ghost imaging (QGI) for high-scattering biological media.

Masters Project, Indian Institute of Science Education and Research, Bhopal May 2018-April 2019

- Worked on synthesis of CsPbBr3 nanocrystals and few layered MoS2. Used optical absoption, photoluminescence and transient absorption pump-probe spectroscopy techniques to show the presence of indirect charge transfer excitons in the heterostructure which led to 1 peer-reviewed conference paper.

Peer-reviewed Publications

- **Quantum-Enhanced Detection of Viral cDNA via Luminescence Resonance Energy Transfer Using Upconversion and Gold Nanoparticles,** (Under Review)
  S.Esmaeili, N. Rajil, A. Hazrathosseini, B. Neuman, M. Alkhatani, **D. Sen**, Q.Hu, H. Wu, Z. Yi, R. Brick, A. Sokolov, P. Hemmer, M. Scully
  (Under Review)
- **Detecting novel plant pathogen threats to food system security by integrating the Plant Reactome and remote sensing,**
  S. Murray, A. Verhoef, A. Adak, **D. Sen**, R. Salzman, P. Jaiswal and S. Naithani
  *Current Opinion in Plant Biology **83**, 102684*, (2025)
- **In-vivo Raman microspectroscopy reveals differential nitrate concentration in different developmental zones in Arabidopsis roots,** (Accepted)
  A. Fernández*, Z.T. Fang*, **D. Sen***, B. Henrich, Y. Nagashima, A.V. Sokolov, S. Okumoto and A.J. Verhoef (* equal contribution)
  *Plant Methods **20**, 185 (2024)*
- **Non-Destructive Direct Pericarp Thickness Measurement of Sorghum Kernels Using Extended-Focus Optical Coherence Microscopy,**
  D. Sen*, A. Fernández*, D. Crozier, B. Henrich, A.V. Sokolov, M.O. Scully, W.R Rooney and A.J. Verhoef (* equal contribution)
  Sensors **23(2)**, 707 (2023).

- **Extended focal Depth Fourier Domain Optical Coherence microscopy with Bessel-Beam – LP02 mode – from a Higher Order mode fiber,**
  D. Sen, A. Classen, A. Fernández, L. Grüner-Nielsen, H.C. Gibbs, S. Esmaeili, P. Hemmer, A. Baltuska, A.V. Sokolov, R. Leitgeb and A.J. Verhoef,
  Biomed. Opt. Express **12(12)**, 7327-7337 (2021)

Peer-reviewed Conference Proceedings

- **Modular Raman Microscopy for in-vivo Phenotyping of Nutrient Uptake in Plant Roots,**
  A. Fernández*, **D. Sen***, Z.T. Fang, B. Henrich, A.V. Sokolov, M.O. Scully S. Okumoto and A.J. Verhoef, (equal contribution)
  CLEO: Aoolications and Technology (May 2024, Charlotte, North Carolina)
- **Rapid Quantification of Nitrate in Murashige-Skoog (MS) media using Spontaneous Raman Spectroscopy,**
  D. Sen, Z.T. Fang, A. Fernández, B. Henrich, A.V. Sokolov, S. Okumoto and A.J. Verhoef,
  2023 IEEE Photonics Conference (IPC) (November 2023, Orlando, Florida)
- **Phenotyping Nitrate Uptake and Spatial Storage Using Raman Microspectroscopy,**
  A. Fernández, **D. Sen**, Z.T. Fang, B. Henrich, S. Okumoto and A.J. Verhoef,
  ASA, CSSA, SSSA International Annual Meeting, Paper 150987 (October 2023, St. Louis, Missouri)
- **Non-Destructive Direct Pericarp Thickness Measurement of Sorghum Kernels Using Extended-Focus Optical Coherence Microscopy,**
  D. Sen, A. Fernández, D. Crozier, B. Henrich, A.V. Sokolov, M.O. Scully, W.R Rooney and A.J. Verhoef,
  CLEO: Applications and Technology, STu4F.2 (May 2023, San Jose, California)
- **Label-free Three Photon Deep Imaging in Streptomyces Bacterial Communities,** A. Fernández, **D. Sen**, A.V. Sokolov, M.O. Scully and A.J. Verhoef,
  SPIE Optics + Optoelectronics: Nonlinear Optics and Applications XIII, PC12569-37, (April 2023, Prague, Czech Republic)
- **Implementation of Bessel-like LP02 Mode from Higher Order Mode (HOM) Fiber to extend the Depth of Focus in Fourier Domain Optical Coherence Microscopy (FD-OCM)**
  D. Sen, A. Classen, L. Grüner-Nielsen, H. Gibbs, S. Esmaeili, P. Hemmer, A. Baltuska, A.V. Sokolov, R. Leitgeb, A. Fernández and A.J. Verhoef,
  CLEO: Applications and Technology, AM5I.5 (May 2022, San Jose, California)
- **Modelling the Image Fromation in Fourier Domain Optical Coherence Microscopy for a Bessel-like LPO2 Mode from Higher Order Mode Fiber**
  A. Classen, **D. Sen**, L. Grüner-Nielsen, H. Gibbs, S. Esmaeili, P. Hemmer, A. Baltuska, A.V. Sokolov, R. Leitgeb, A. Fernández and A.J. Verhoef,
  CLEO: Applications and Technology, JW3A.3 (May 2022, San Jose, California)
- **Detection of Starch Content Variations in Grasses using Raman Microscope,**
  A. Fernandez, **D. Sen**, M.C. Lee, N. Havrilchak, M. Aleman, Z. Han, B. Strycker, Z. Yi, J.B. West, A.V. Sokolov, M.O. Scully and A.J. Verhoef,
  CLEO: Applications and Technology, JW3A.21 (May 2022, San Jose, California)
- **Ultrafast Charge-Transfer Mediated Indirect-Excitons in CsPbBr3/MoS2 Heterostructure,**
  R. Karmakar, **D. Sen**, D. Mandal, K V Adarsh .
  CLEO:Science and Innovations, JW1A.100 (May 2021, San Jose, California)

Skills

- **Software**:MATLAB, LaTeX, MS Office, Origin, FreeCAD, Solidworks, ImageJ.
- **Hardware**: Zeiss Stemi 305 stereo microscope, Leica DM6B stereomicroscope, Ocean Optics UV/VIS Spectrometers, B&W Tek Portable Raman spectrometer, Home-built Confocal and optical coherence microscope, Fluorescence correlation spectroscopy, Atomic Force Microscopy, Trasmission Electron Microscopy, Dynamic Light Scattering.
- **Language**: Bengali (native), English (fluent), Hindi (fluent).

Awards, Grants, & Honors

- Acceptance of **User proposal** at **Center of Integrated Nanotechnology (CINT**), Los Alamos National Lab. **Proposal No: 2023BU0141**, **Title:** Quantum Ghost Imaging to Investigate Starch Contents in Sorghum Grains, Role: PI (January 2024-June 2025).
- Acceptance to **Student Leadership 2024** of **OPTICA (formerly Optical Society of America)**.
- Awarded with **Graduate & Professional Student Government Travel Award** ($250) , Texas A&M University (Spring 2024).
- Awarded with **Doctoral Student Research, Travel, and Professional Development Award** ($1946) by Texas A&M University (February 2024).
- Designated as the **Fellow** of **Graduate Mentoring Academy**, Texas A&M University (December 2023).
- Awarded with **Graduate Student Travel Grant** ($500) by Department of Physics & Astronomy, Texas A&M University (Fall 2023).
- Awarded with **Robert A. Welch Foundation Graduate Fellowship**, (Spring 2022-Spring 2023) and (Spring 2024).
- **CIRTL Associate-Fellow** of the Academy for Future Faculty by the Center for Teaching Excellence (CTE) & Office of Graduate and Professional Studies (OGAPS), Texas A&M University (April 2023).
- Recepient of **Travel Award** ($600) from **Texas Section of American Physical Society (TSAPS)** to attend Spring TSAPS/TSAAPT/SPS conference (March 2023).
- Awarded with **Graduate Student Travel Grant** ($800) by Department of Physics & Astronomy, Texas A&M University (Spring 2022).
- Awarded with **HEEP Fellowship** in the **Institute for Quantum Science and Engineering (IQSE)**,Texas A&M University (Fall 2021).
- Awarded with **I-PhD Fellowship** by **Ministry of Education (MoE)**, Government of India (August 2016-May 2019).
- Awarded with **INSPIRE Scholarship** by **Department of Science & Technology (DST)**, Government of India (August 2013-July 2016).
- Awarded with **Bronze Medal** in **District Science Youth Fair**, organized by State Government of West Bengal, India (2015).
- Awarded with **Brojendranath Ghosh Award** for securing highest rank among Physics BSc. students of **The University of Burdwan** (2014)

Teaching Experience

Graduate Assistant, Texas A&M University August 2019 -till date

- Prepared teaching materials and conducted recitation for **Electricity & Magnetism** (PHYS 207).
- Conducted Lab sessions for **Newtonian Mechanics** (PHYS 201).
- Graded graduate level courses: **Statistical Mechanics** (PHYS 607) and **Mathematical Physics** (PHYS 615).

Leadership and Community Services

- **Executive Committee member** of **Optical Coherence Tomography and Microscopy** Technical Group of **OPTICA** (September 2024-till date)
- **President** of **OPTICA (formerly Optical Society of America), Texas A&M Chapter** (May 2024-till date).
- **Facilitator** of **Graduate Mentoring Academy** at Texas A&M University (January 2024-till date).
- **Volunteer** for annually conducted **Physics & Engineering Festival**, Texas A&M University (2022-till date).
- **Judge** for **Texas Junior Academy of Science (TJAS)** (October 2024)
- **Vice President** of **OPTICA (formerly Optical Society of America), Texas A&M Chapter** (March 2023-April 2024).
- **Reviewer** of **Outstanding Graduating Mentoring Awards 2024** at Texas A&M University.
- **Judges Coordinator** of **Student Research Week (SRW), 2024** at Texas A&M University.

- **Official** of **2024 Texas Regional Science Bowl** (February 2024).
- **Judge** for 50th **Texas Junior Science and Humanities Symposium (TJSHS)** (January 2024)
- **Volunteer** for **IEEE Photonics Conference 2023** (November 2023) at Orlando, Florida.
- **Volunteer (Exam grader)** for **Texas Science Olympiad (TSO)** tournament, (April 2023).
- **Graduate student mentor** of **Mentoring and Advising Graduates in an Inclusive Community (MAGIC)**, Department of Physics, Texas A&M University (Fall 2022-till date).
- **Senator** of **Student Activity Council (SAC)**, IISER Bhopal, 2018-2019.
- **Department Representative**, Physics, IISER Bhopal, 2018-2019.

Memberships, Reviewing Activities

- **Membership:** OPTICA (fromerly OSA) (since 2019), American Physical Society(APS) (since 2020),Institute of Electrical and Electronics Engineers (since 2022), SPIE (since 2023).
- **Reviewer:** Laser Physics Letters (since 2023), Laser Physics (since 2023).

References

Prof. Alexei Sokolov
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Dr. Aart Verhoef
Assistant Professor
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Prof. Philip Hemmer
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