Dip N. Mahato, PhD
Associate Professor of Instruction, TXST, Physics/MSEC
Associate Professor (Adj), Physics/Engineering, ACC

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An applied physicist with enormous experience in teaching and research in areas of logic technology development systems, semiconductor process engineering & device nanofabrication, optical fiber sensors, and experimental x-ray analysis for medical/materials applications

Academic Qualification:

- **Doctor of Philosophy (Ph.D.)**, Applied Physics, State University of New York, Albany, 2009.
- **Master of Science** (**M.S.**), Physics, State University of New York, Albany, 2006.
- **Master of Philosophy (M.Phil.)**, Applied Physics, Kathmandu University, 2000.
- **Master of Science (M.Sc.),** Physics, Tribhuvan University, 1993.
- **Bachelor of Science (B.Sc.),** Physics/Chemistry/Mathematics, Tribhuvan University, 1991.

Professional Experience:

Teaching at TXST, ACC, SUNY, KU & TPR:

- **Associate Professor of Instruction,** Physics & MSEC, Texas State University, since Aug 2024.
- **Lecturer,** Dept. of Physics & MSEC, Texas State University, Aug 2019 – July 2024.
- **Adjunct Associate Professor,** Physics & Engineering, ACC, since May 2019.
- **MCAT Physics Instructor,** The Princeton Review, Austin, Jan 2019 – Jan 2021.
- **Adjunct/Lecturer/TA,** Physics, State University of New York (SUNY), Jan 2005 – Jan 2009.
- **Study Group Facilitator**, Office of Academic Supports, EOP, SUNY, Jan 2006 – Dec 2008.
- **Assistant Professor,** Physics, Kathmandu University, Nepal, Dec 2001 – Aug 2004.
- **Lecturer,** Physics, Kathmandu University, Nepal, Jan 1997 – Dec 2001.
- **Instructor,** Physics, Kathmandu University, Nepal, Feb 1995 – Jan 1997.

Research at Corporate Facilities (Semiconductor process technology development engineering):

- **Senior Engineer**, Samsung Electronics, Austin, Texas, March 2017 to August 2019.
- **PTD Staff Engineer**, Intel Corporation, Hillsboro, Oregon, April 2015 to March 2017.
- **Process TD Engineer**, Intel Corporation, Hillsboro, Oregon, April 2009 – April 2015

Research at Academic Institutions:

- **Associate Professor of Instruction,** Physics & MSEC, Texas State University, since Aug 2024.
- **Lecturer,** Dept. of Physics & MSEC, Texas State University, Aug 2019 – July 2024.
- **Research Assistant**, College of Nanoscale Science and Engineering (CNSE), SUNY & GE Global Research Collaboration, Summer 2005 - 2007.
- **Research Assistant**, Center for X-ray Optics, Department of Physics, SUNY, 2007 - 2008.
- **CPT Appointee,** GE Schenectady NY and CNSE, SUNY, Summer 2006 and 2007.

Honors/Awards:

PhD Honors:

- Teaching Assistant of the Year 2007 Award, Physics, SUNY, USA, 2007.
- GSEU Award, SUNY, USA, 2006 and 2007.
- Recognized as scientific contributor to PASCAL, SUNY, USA, 2007.
- Recognized as instructional contributor to Educational Opportunity Program, SUNY, USA, 2008.

MS Honors:

- UGC Fellowship for Physics (M. Phil.) Research in PVD Thin Film at KU, Nepal, 1998 – 2001.
- NAST Fellowship for Physics (M.Sc.) Research in Plasma Physics at TU, Nepal, 1993 - 1997.

Intel Honors:

- Logic Technology Development Systems Divisional Award-1 and 2, Intel, USA, 2016.
- Logic Technology Development Systems Divisional Award, Intel, USA, 2012-2015.
- Dry193/248 Track/Layer Goodie Drawer Level I Award, Intel, USA, 2011.
- Immersion lithography Rock Star (Goodie Drawer Level II) Award, Intel, USA, 2010.

Professional Activities (Teaching, Research & Service):

Currently (in 2026) at Texas State University:

- Serving on graduate thesis committee since 2022

Graduate Students	Thesis Title	Status
Anil Kumar Mandal (MS)	The Effect of Flow on the Magnetic Anisotropy of 3D-Printed Strontium-Ferrite/PA12 Magnetic Composites	Work in progress
Erik Drummond	Work in progress	Work in progress
Noah Austin-Bingamon (PhD)	Frequency and Damping Noise of Atomic Force Microscopy Cantilevers with Optomechanically Modified Quality Factor at Low Temperature	Work in progress
Roy C. Dominguez (MS)	Kelvin Probe Force Microscopy Study of Moiré Potential on Twisted Hexagonal Boron Nitride	Work in progress

- Serving as an active member of creating documents for NTL faculty promotion ladder, 2025.
- Developing syllabi and setting up lab for teaching physics and MSEC classes to graduate and undergraduate students, 2019 to Present.
- Reviewing curriculum for PHYS 1345 General Physics for Life Sciences:
  - Revised and routed for approval (Fall 2025) effective as of Spring 2026.
- Leadership (***departmental and university level service***)
  - Team Leader for undergraduate course team (PHYS 1345, Spring 2025)
  - Official Advisor of Nepalese Student Association (NSA) under and required by TXST Student Organization Leadership and Development, 2025
- Serving as a colloquium organizer since 2020 (***department level service***):
  - Invited and scheduled 5 external speakers for delivering colloquia in Fall 2025
  - Invited and scheduled 5 external speakers for delivering colloquia in Spring 2025
  - Invited 28 external speakers as of Fall 2024, coordinated with all those speakers via email communications, circulated announcement within and inter-department, scheduled their colloquia, helped with onsite parking and driving directions, and processed their travel reimbursement (Air/Ground/Mileage/Meal), helped build networking between them and our faculty/students.
  - Invited 7 internal speakers as of Spring 2024, coordinated and scheduled their colloquia to follow the departmental tradition to hear research updates from faculty in line with tenure process.

Past (as of December 2024) at Texas State University:

- Served on graduate thesis committee since 2022

Graduate Students	Thesis Title	Status
Sujan Pyakurel (MS)	Optimizing the Hole Transport Layer (HTL) for Triple Halide Perovskite (Cs22Br15) based Photovoltaic Cell	Completed, November 2024
Biddhut Lamichhane (MS)	Chlorine-Based Dry Etch of GaN and Epitaxial Re-growth of $Al_xGa_{1-x}N$ on Selectively Etched $Al_xGa_{1-x}N$/GaN Surface by Metal Organic Chemical Vapor Deposition (MOCVD) Method	Completed, August 2024
Pukar Sedai	Epitaxial Growth of Niobium Films on Different Orientations of Sapphire Substrates	Completed, July 2024
Noah Austin-Bingamon (MS)	Frequency and Damping Noise of Atomic Force Microscopy Cantilevers with Optomechanically Modified Quality Factor at Low Temperature	Completed, July 2023
Ujjwal Dhakal (MS)	Characterization of InAs quantum dots in InP Nanowires Using a Kelvin Probe Force Microscopy	Completed, June 2024
Rajendra Rai (MS)	Electrical Conduction of Platinum Nanowires Deposited by Focused Electron Beam Induced Deposition (FEBID)	Completed, June 2024

- Served as an active member of creating documents for NTL faculty promotion ladder, 2023 & 2024.

- Mentored new faculty (Ran Sivron and Saeed Moshfeghyaganeh) for onboarding and professional development for their career growth, 2022 & 2023.
- Served as an active member of STEM community curriculum development and teaching/learning strategies for physics for life science majors courses (PHYS 1335 and PHYS 1345), 2022, 2023 & 2024.
- Served as physics representative in Bobcat-Day, 2021 – 2023.
- Supervised students for independent studies in semiconductor process engineering:
  - Md Shihab Uddin (Spring 2025)
  - Shashank Neupane (Spring 2024)
  - Erik Drummond (Fall 2024)
- Leadership (***departmental and university level service***)
  - Team Leader for undergraduate course team (PHYS 1345, Spring & Fall 2024)
  - Team Leader for undergraduate course team (PHYS 1430, Fall 2023)
  - Official Advisor of Nepalese Student Association (NSA) under and required by TXST Student Organization Leadership and Development, 2023 & 2024

Current (ACC):

- Developing syllabi and setting up lab for teaching physics and engineering classes, since 2019.

Past (SUNY and KU):

- Developing syllabi and setting up lab for teaching physics/engineering classes, SUNY, 2004 - 2009.
- Serving on physics graduate studies committee at SUNY, 2005 – 2008.
- Developing syllabi and setting up lab for teaching physics/engineering classes, KU, 1995 - 2004.
- Conducting physics, engineering, medical exams, KU, 2001 – 2003.

Past (Extra-Curricular):

- Working on STEM-based child development academy and a day-care system in Georgetown/Leander area so as to provide quality education in STEM discipline and best services to the community.
- Delivering invited lectures in MCAT physics at The Princeton Review.

Past (Intel and Samsung):

- Mentoring MT's/ET's for their career growth.
- Training new hires on tracks, layers, process etc.
- Virtual factory seed training for HVM technology transfer.
- Interviewing RCG's for new hiring.
- Active participation in Intel diversity program.

Professional Qualifications, Career Progress and Accomplishments:

- Teaching (and research in) master's and doctoral level nanoengineering, nanomaterials and semiconductor device nanofabrication physics classes (PHYS 5322, PHYS 5327, MSEC 7360, MSEC 7350), heavily based on cleanroom activities, TXST, 2019 – Present.
- Teaching upper division undergraduate students, and supervising their projects in applied electronics.
- Supervising upper division undergraduate students enrolled for independent studies.
- Teaching undergraduate-level upper physics classes (e.g. PHYS 3416, PHYS 1430, PHYS 1345, PHYS 1335, PHYS 1325, PHYS 1320, PHYS 1315), 2019 – Present.
- Taught graduate & undergraduate level physics classes (Classical Mechanics by H. Goldstein, Quantum Mechanics by Powell & Crasemann, Quantum Mechanics by L. I. Schiff, Electrodynamics by Milford & Reitz, Electrodynamics by D. Griffith, Electrodynamics by J. D. Jackson, Mathematical Physics by C. Harper, Mathematical Physics by Mathews & Walker, Mathematical Physics by L. A. Pipes, Statistical Physics by K. Huang, Statistical Physics by R. Pathria, Solid State Physics by A. J. Decker, Solid State Physics C. Kittel, 1995 - 2004.
- Taught undergraduate physics classes (Cutnell & Johnson, Halliday & Resnik, Serway & Jewett, Sears-Zeemansky-Young etc) in both lecture-based and active-learning formats, SUNY, 2005 - 2008.
- Performed process engineering in 32nm, 22nm, 14nm, 10nm technology nodes in semiconductor manufacturing, including some work in 7nm and 5nm technology nodes.
- Broad knowledge in Nikon/ASML/TEL lithius and pro-V link systems in 193nm Immersion and 193/248nm dry areas as well as HITACHI SEM and associated tools. This includes writing new recipes for process development and coordinating with integrated teams for piloting and implementing new processes through knowledge and understanding of layers, tool recipe/configuration, module process,

upstream/downstream process flow, effect of chemical dispense and arm motion, layer characterization, targeting and coherence matching, defects reduction for high yield etc.

- Data analysis on the process recipes for troubleshooting issues with attention to details and excellent planning skills for sustaining excellence, problem-solving, writing SOP/BKM and procedural/safety specifications, creating new charts, setting up new monitors for automation etc.
- High level engineering skills at maintaining SPC charts for monitors/inline process robustness, tools/layers health, PM execution to maintain excursion-free environment in the process module.
- Project management with multi-tasking skills, flexible team player and highly motivated self-starter.
- Defining roadmaps to meet requirements, goals and milestones for a new technology process, stablishing lithography and integrated process flow, procedures, and equipment configuration. selecting and developing materials and equipment for the process to meet quality, reliability, cost, yield, productivity and manufacturability requirements.
- Planning and conducting DOE to fully characterize the process throughout the development cycle, driving improvements on quality, reliability, cost, yield, robustness, productivity and safety/ergonomic over variables such as material, method, equipment, environment and operating personnel.
- Developing solutions to problems using statistical knowledge and problem-solving tools, establishing process control systems for the process module and sustaining the module through volume ramp.
- Developing strategy to resolve difficult problems and establishing systems to deal with these problems in the future, training other engineers for transferring process to high volume manufacturing and providing support in new factory start-up as well as installing and qualifying the new production lines.

Technical Knowledge, Skills/Abilities:

Synthesis/Characterization:

- DNA synthesis and characterization
- Pd-based thin film gas sensors, design, characterization and implementation.
- Metal/Alloys thin films; growth and characterization.

Technical and Analytical Skills:

- Ion-beam implantation, Rutherford backscattering.
- PVD, CVD, Oxidation, Lithography, Etch, ALD, AFM, EDS, Profilometry, Ellipsometry, XRR.
- Nikon/ASML/TEL lithius and pro-V link systems in 193nm Immersion and 193/248nm dry litho.
- EUV, DSA patterning, photoresist characterization for pattern transfer.
- HITACHI SEM and associated tools, recipe writing, automation control etc.
- Regen chemical engineering for rework process.
- FMEA, Defect analysis, e-test and yield improvement

Structural and Electronic characterization:

- X-ray Diffraction (XRD), Polycapillary tubes, X-ray analysis for medical and materials applications.
- X-ray Imaging for early detection of cancerous cells, and Radiation Dosimetry for cancer therapy.
- Electronic structure calculation of chemical and biological systems.
- DFT and Gaussian computing systems.

Semiconductor Process:

- Tool configuration from photoresist/layer perspectives in dry/immersion BE and FE 248/193 areas on both lithius and pro-v link systems.
- Inline/SM Defects, GFA, tool/process issue, troubleshooting and possible fix.
- SPC, PCSA, JMP, Factory Automation, new chart-setup, F4 events, TWT, dispatch, Link (track/scanner) operation, track processing, process recipe determination, new tools qualification.
- Process flow, recipes, process change, steps and requirements of piloting a WP and implementation.
- Defmet, QTM, RECL/FL, Rework, etest, process window, EDI, etch-bias, yield analysis.
- NPI, CDSEM, CBC, FA, XSEM analysis, BKM, RFC, SPEC, training SEEDs for HVM transfer.
- Broad knowledge in 32nm, 22nm, 14nm, 10nm technology nodes; also, involved in some layer developments on 7nm technology node and some coordination with 5nm team.

Computer/Software Skills:

- YMS, Nautilus, Lafael softwares.
- JMP, GAJT, SPC, PCSA, MGPC3, SQL PathFinder.
- CrystalBall, Discovery, Klarity.

- Origin, MAPLE, MATLAB, Fit-2D, ACP.
- Windows, PowerPoint, Word, Excel, Origin.
- Gaussian Computing Systems, RIKEN Super-computers.

Research Publications:

Refereed Articles:

- Wei Xia, David Anderson, Felix Lin, Jonathan Cohrs, Shazad Paracha, Dip Mahato, Eric Ellis, "Photoresist Lifting Induced Oxide Bridge Defects", IEEE, ASMS-2019.
- Hassan Abbas, **Dip N. Mahato**, C. A MacDonald, "Measurements and Simulations of Focused Beam for Orthovoltage Therapy", Medical Physics, 41, 041702 (2014).
- **Dip N. Mahato**, C.A. MacDonald, "Potential for Focused Beam Orthovoltage Therapy", Proc. SPIE, 7806, 78060F1-78060F7, 2010.
- Wei Zhou, **Dip N. Mahato** and C.A. MacDonald, "Analysis of Powder X-Ray Diffraction Resolution Using Collimating and Focusing Polycapillary Optics", Thin Solid Films, 518, 5047-5056, 2010.
- **Dip N. Mahato**, Archana Dubey, R.H. Pink, R.H. Scheicher, S.R. Badu, K. Nagamin, E.Torikai, H.P. Saha, Lee Chow, M.B. Huang, T.P. Das, "Theoretical Investigation of Nuclear Quadrupole interactions in DNA at First–Principles Level", Hyperfine Interact, 181, 601-606, 2008.
- K. Ramani Lata, N. Sahoo, Archana Dubey, R.H. Scheicher, S.R. Badu, R.H. Pink, **Dip N. Mahato**, A.F. Schulte, H.P. Saha, N.B. Maharjan, L. Chow, T.P. Das, "Investigation of the hyperfine properties of deoxy hemoglobin based on its electronic structure obtained by Hartree-Fock-Roothan procedure", Hyperfine Interact, 181, 75-80, 2008.
- Ayhan Bingölbali, Wei Zhou, **Dip N. Mahato** and C.A. MacDonald, "Focused beam powder diffraction with polycapillary and curved crystal optics", Advances in X-ray/EUV Optics and Components III, SPIE, 7077, 70770M.1 – 70770M.8, 2008.
- **Dip N. Mahato**, R.H. Pink, S.R. Badu, R.H. Scheicher, Archana Dubey, H.P. Saha, Lee Chow, Mahendra K. Mahanti, M.B. Huang, T.P. Das, "First Principles Study of Nuclear Quadrupole Interactions in the Molecular Solid BF3 and the Nature of Binding between the Molecules", Hyperfine Interact, 176, 15-20, 2007.
- R. H. Pink, Archana Dubey, **Dip N. Mahato**, R. H. Scheicher, Mahendra K. Mahanti, M. B. Huang, H. P. Saha, Lee Chow, T. P. Das, "Theory of Electronic Structure and Nuclear Quadrupole Interactions in the BF_3-NH_3 Complex and Methyl Derivatives", Hyperfine Interact, 176, 39-44, 2007.
- Archana Dubey, H.P. Saha, R.H. Pink, S.R. Badu, **Dip N. Mahato**, R. H. Scheicher, Mahendra K. Mahanti, Lee Chow, T.P. Das, "Nuclear Quadrupole Interactions and Electronic Structure of BF_3H_2O Complex", Hyperfine Interactions, 176, 45-50, 2007.
- R. H. Pink, Archana Dubey, **Dip N. Mahato**, R. H. Scheicher, Mahendra K. Mahanti, M. B. Huang, H. P. Saha, Lee Chow, T. P. Das, "First Principles Study of Quantitative Strengths of Covalent Bonding and Van der Waals Interaction in $BF_3 \cdot NH_3$ Complex and Associated Nuclear Quadrupole Interaction" (*Ready to be submitted*).
- **Dip N. Mahato**, L. N. Jha, "Maximum Energy of Electrons in Beat-Wave Accelerator", Proc. Nepal Physical Society, vol.15 (1), 36-39, 1998.

Conference Abstracts:

- H. Abbas, **Dip N. Mahato,** J. Satti, C. A. MacDonald, "Potential for Focused Low Energy X-ray Beam for Therapy", AAPM 54th Annual Meeting, Charlotte, North Carolina, Jul 29 - Aug 2, 2012.
- **Dip. N. Mahato**, A. Dubey, R.H. Scheicher, R.H. Pink, K. Nagamine, E. Torikai, H.P. Saha, L. Chow, M.B. Huang, T.P. Das, "First Principles Investigation of Nuclear Quadrupole Interactions in DNA", **XIV International Conference on Hyperfine Interactions & XVIII International Symposium on Nuclear Quadrupole Interactions, Iguazu Falls, Brazil, August 5-10, 2007**.
- **Dip. N. Mahato**, R.H. Pink, R.H. Scheicher, A. Dubey, H.P. Saha, L. Chow, M.K. Mahanti, T.P. Das, "First Principle Study of Nuclear Quadrupole Interactions in the Molecular Solid BF$_3$ and the nature of binding between the Molecules", **XIV International Conference on Hyperfine Interactions & XVIII International Symposium on Nuclear Quadrupole Interactions, Iguazu Falls, Brazil, August 5-10, 2007.**
- T.P. Das, K. Ramani Lata, R.H. Pink, **Dip N. Mahato**, Archana Debey, H.P. Saha, A.F. Schulte, Lee Chow, R.H. Scheicher, N.B. Maharjan, N. Sahu, "Hartree – Fock study of the Heme Unit of deoxy-hemoglobin for Hyperfine Interactions and Vibrational Properties", L35.00001, APS March 2007 Meeting, Denver, Colorado, March 5-9, 2007.

- **Dip N. Mahato**, R.H. Pink, M.B. Huang, T.P. Das, Archana Dubey, Lee Chow, Mahendra K. Mahanti, R. H. Scheicher, "First-Principles Study of the Nature of Binding in BF$_{3}$ Molecular Solids", L19.00008, APS March 2007 Meeting, Denver, Colorado, March 5-9, 2007.
- Archana Dubey, H.P. Saha, Lee Chow, R.H. Pink, **Dip N. Mahato**, M.B. Huang, T.P. Das, R.H. Scheicher, Mahendra K. Mahanti, "Investigation of Bonding in the BF$_{3}$-H$_{2}$O Complex", L19.00006, APS March 2007 Meeting, Denver, Colorado, March 5-9, 2007.
- R.H. Pink, Junho Jeong, **Dip N. Mahato**, M.B. Huang, T.P. Das, R.H. Scheicher, Sitaram Byahut, "First-Principles Study of Er Location in Er-Si Systems with Oxygen Co-Dopants", U40.00005, APS March 2007 Meeting, Denver, Colorado, March 5-9, 2007.
- R.H. Scheicher, **Dip N. Mahato**, R.H. Pink, M.B. Huang, T.P. Das, Archana Dubey, H.P. Saha, Lee Chow, "Study of Electronic Structures of Nucleobases and Associated Nuclear Quandrupole Interactions for ^{14}N, ^{17}O and ^{2}H in A-DNA and B-DNA", V35.00009, APS March 2007 Meeting, Denver, Colorado, March 5-9, 2007.
- **Dip N. Mahato**, R.H. Pink, M.B. Huang, T.P. Das, Archana Dubey, Lee Chow, Mahendra K. Mahanti, R.H. Scheicher, "Electron Distribution in Solid BF3 and BF3 - NH3 - Associated Nuclear Quadrupole Interactions", Bulletin of the American Physical Society March Meeting , Baltimore, MD, USA, 2006.
- Archana Dubey, H.P. Saha, Lee Chow, R.H. Scheicher, N. Sahoo, R.H. Pink, **Dip N. Mahato**, M.B. Huang, T.P. Das, "Unrestricted Hartree-Fock Investigation of the Electron Distribution on the Heme System in Azidohemoglobin- ^{57m}Fe and ^{14}N Hyperfine Interactions", Bulletin of the American Physical Society March Meeting, Baltimore, MD, USA, 2006.
- Chow, Lee; Dubey, Archana; Collins, Gary S.; Scheicher, R. H.; Pink, R. H.; **Mahato, Dip N.**; Das, T. P. , "Study of Trapping Sites for Beryllium Atom in C_{60}-Fullerene and Electron Capture for ^{7}Be Nucleus", Bulletin of the American Physical Society March Meeting , Baltimore, MD, USA, 2006.
- R.H. Pink , **Dip N. Mahato** , M.B. Huang , T.P. Das , Archana Dubey , Lee Chow, Mahendra K. Mahanti, R.H. Scheicher, "Theory of Electronic Structure and Nuclear Quadrupole Interactions in the BF3-NH3 Complex", Bulletin of the American Physical Society March Meeting , Baltimore, MD, USA, 2006.
- Mahendra K. Mahanti, Archana Dubey, H.P. Saha , Lee Chow , R. H. Scheicher, R.H. Pink , **Dip N. Mahato** , M.B. Huang , T.P. Das, "Theory of Nuclear Quadrupole Interaction in Trifluoro-Aminoboranes [BF$_{3}$-NH$_{3-X}$(CH$_{3}$)$_{X}$]", Bulletin of the American Physical Society March Meeting, Baltimore, MD, USA, 2006.
- **Dip N. Mahato**, S. R. Kafle, "Experimental Analysis of Resistive Properties of Thin Films Prepared by Physical Evaporation of Constantan and Nichrome", Bulletin of the Fourth National Conference of RONAST, 2004.