Stuart D. Loch

Professor of Physics | Auburn University, Auburn, AL

Condensed Curriculum Vitae

Professional Profile

Professor of Physics at Auburn University and an international research program in computational atomic physics and plasma spectroscopy. Research focuses on atomic data and spectral modeling for fusion-energy experiments, laboratory plasmas, and astrophysical environments. Extensive experience in undergraduate and graduate teaching, mentoring, curriculum development, interdisciplinary collaboration, and academic service.

Academic Appointments

Auburn University, Department of Physics: Professor, 2017-present; Associate Professor, 2011-2017; Assistant Professor, 2006-2011; Research Scholar, 2002-2006.

University of Strathclyde, United Kingdom: Research Scholar, 2001.

Education

- Ph.D. in Physics, University of Strathclyde, United Kingdom, 2001.
- B.Sc. in Physics, University of Strathclyde, United Kingdom, 1997.

Research and Scholarship

Dr. Loch leads and contributes to collaborative research that connects fundamental atomic physics with complex plasma spectra. His work supports fusion diagnostics, laboratory experiments, astrophysical spectroscopy, and modeling of transient and high-energy environments.

Research Areas

- Electron-impact excitation and ionization, dielectronic recombination, collisional-radiative modeling, and atomic-data uncertainty analysis.
- Atomic structure and spectral diagnostics for fusion-energy and laboratory plasmas, including heavy-element and plasma-facing-component studies.
- Atomic data and non-equilibrium spectral modeling for astrophysical plasmas, supernova remnants, planetary nebulae, and neutron-star-merger ejecta.

Publication and Presentation Record

- 128 peer-reviewed journal articles and 6 refereed conference papers.
- 15 invited conference presentations, together with additional invited seminars, conference talks, and posters.

Sponsored Research

Received competitive funding from the National Science Foundation, National Aeronautics and Space Administration, U.S. Department of Energy, Alabama Department of Education, and Auburn University research and college programs.

Selected Research Collaborations

Collaborations include the international ADAS consortium, DIII-D National Fusion Facility, Princeton Plasma Physics Laboratory, Center for Astrophysics at Harvard & Smithsonian, Oak Ridge National Laboratory, Queen's University Belfast, and University of Georgia.

Teaching and Mentoring

Has taught extensively at both the undergraduate and graduate levels, from introductory physics to advanced theoretical, computational, and spectroscopy-focused instruction, using traditional, flipped, active-learning, honors, online, and project-based formats.

- Developed and redesigned undergraduate and graduate curricula and helped implement active learning, common assessments, learning-assistant support, and online mathematics preparation.
- Supervised or co-supervised 13 completed Ph.D. students and 3 completed master's students.
- Served on 14 additional graduate committees or as an outside reader and mentored at least 15 undergraduate researchers.

Selected Honors and Awards

- Dr. William L. Alford Endowed Professorship in Physics 2026-present
- Alumni Professor, Auburn University, 2019-2024.
- Most Outstanding Professor, selected by Auburn Physics students, 2022 and 2024.
- Marguerite Scharnagel Endowed Professorship, College of Sciences and Mathematics, 2016-2017.
- Gerald and Emily Leischuck Endowed Presidential Award for Excellence in Teaching, 2014.
- Outstanding Faculty Member for the College of Sciences and Mathematics, Auburn Student Government Association, 2014.
- Eugene J. Clothiaux Faculty Teaching Award, College of Sciences and Mathematics, 2013.
- Selected to give Auburn University's Final Lecture, 2013; Professor of the Year, Auburn Chapter of Alpha Epsilon Delta, 2013.

Academic and Professional Service

- Core Course Coordinator for the Auburn University Department of Physics, 2013-2019 and 2024-2025.
- Chair of the departmental Graduate Doctoral Examination Committee, 2020-2022, with additional service on graduate education and curriculum committees.
- Leadership and membership on faculty searches at the department, college, and university levels, including several appointments as chair or co-chair.
- Member of the College of Sciences and Mathematics Promotion and Tenure Committee, 2018-2021, and contributor to science-education and teaching-improvement committees.
- Journal peer reviewer; proposal reviewer for NASA, the U.S. Department of Energy, and the National Science Foundation; organizer and instructor for ADAS training workshops.

Outreach

Sustained outreach has included public astronomy events, Science Olympiad, AU Explore, school visits, science demonstrations, college-recruitment activities, and professional development for Alabama high-school physics teachers.

Professional Memberships

American Physical Society; American Astronomical Society; Institute of Physics, London.