Ash Danehkar

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Technical Skills

Languages: Python (SciPy, NumPy, Matplotlib), C++, FORTRAN, JavaScript, Pascal, IDL/GDL, MATLAB, HTML/CSS
Data Science: Statistical Methods, Data Visualization, Time-series Analysis, Principal Component Analysis
Parallel Computing: OpenMPI, Intel MPI, OpenACC, CUDA, CuPy, SLURM, Linux/UNIX environments
Technologies: Linux and other UNIX variants, Windows and MS-DOS, LaTeX, BibTeX, LibreOffice/MS Office

Experience

Mercor (San Francisco, CA) — **April 2025 – Present**
AI Trainer–Astrophysics Expert (Contract/Part-time) — *Remote, US*
- Collaborated with interdisciplinary teams to improve generative AI tools in Physics and Astronomy.
- Created training prompts for foundation models (LLMs) to refine responses for problems in Physics and Astronomy.

Eureka Scientific, Inc (Oakland, CA) — **March 2022 – Present**
Research Scientist (through NASA grants) — *Remote, US*
- Conducted X-ray data analysis of black hole spins in radio-quiet AGN, and MCMC-based statistical analysis.
- Performed Principal Component Analysis (PCA) and statistical methods to study variability in X-ray spectral data.
- Used MCMC methods to obtain Bayesian posterior constraints for parameters of the relativistic reflection model.

University of Michigan — **Jan. 2019 – Dec. 2021**
Research Fellow — *Ann Arbor, MI, US*
- Performed hydrodynamic simulations and photoionization modeling of superwinds and superbubbles.
- Used the hydrodynamics code FLASH, the photoionization code CLOUDY, and stellar population synthesis models.

MIT Department of Physics — **Sept. 2018 – Dec. 2018**
Teaching Assistant (Part-time) — *Cambridge, MA, US*
- Provided assistant in evaluation of the course "Holographic Duality" (PHY 8.871); checked solutions with Mathematica.

Harvard–Smithsonian Center for Astrophysics — **Sept. 2015 – Aug. 2018**
Postdoctoral Fellow — *Cambridge, MA, US*
- Conducted X-ray spectral analysis of AGN and hard X-ray emitting symbiotics, imaging analysis of ionized nebulae, and MCMC-based Bayesian statistical analysis; Performed data reduction of HST images with AstroDrizzle and DrizzlePac.
- Conducted MCMC-based Bayesian statistics analysis to obtain posterior constraints of best-fit model parameters.
- Developed MPI_XSTAR, a MPI-based parallelization interface for the XSTAR photoionization code.

Think Education — **Feb. 2015 – Jul. 2015**
LMS Specialist (Seasonal) — *Sydney, NSW, Australia*
- Responsible for designing, building, and supporting e-learning materials on Learning Management Systems (LMS).
- Updated online courses and assessments on LMS (Moodle and Blackboard) in collaboration with instructors.

Macquarie University — **April 2010 – Sept. 2014**
Doctoral Researcher — *Sydney, NSW, Australia*
- Conducted optical integral field spectroscopy, plasma diagnostics, and chemical abundance analysis of ionized gaseous nebulae, 3-D photoionization and kinematic modeling. Funded by a Macquarie Research Excellence Scholarship.
- Developed IDL and Python codes for plasma diagnostics and abundance analysis.
- Used the 3D photoionization code (Monte Carlo simulations) for constraining 3D gaseous structures.
- Built 3D kinematic models using the interactive kinematic modeling tool SHAPE.
- Performed astronomical data reduction using IRAF (Image Reduction and Analysis Facility).
- Conducted manual ground-based observing runs with the ANU 2.1m telescope at Siding Spring Observatory.

Teaching Assistant (Part-time; Sept. 2011 – Aug. 2012)
- Supervised and advised undergraduates in laboratories of Mechanics (PHYS107) and Electromagnetism (PHYS202).

Queen's University Belfast — **Sept. 2008 – Dec. 2009**
Postgraduate Researcher — *Belfast, Northern Ireland, UK*
- Investigated the formation of electrostatic solitary waves in space plasmas. Funded by a Postgraduate Studentship provided by the Department for Employment and Learning (DEL) Northern Ireland.
- Used MATLAB and Mathematica for numerical analysis of differential equations.

University of Craiova
Visiting Early-Stage Researcher   Feb. 2008 – Oct. 2008   *Craiova, Romania*
- Performed research on theoretical and mathematical physics. Funded by the Marie Curie Research Training Network.
- Used Mathematica for tensor calculus of general relativity and quantum field theory.
- Utilized LaTeX for academic writing through WinEdt and Scientific WorkPlace 5.5.

University of Rostock
Graduate Assistant   Sept. 2005 – Sept. 2007   *Rostock, Germany*
- Used computational methods for problems in electromagnetism and thermodynamics, such as finite element method.
- Acquired experiences with parallel computing (MPI) and distributed real-time systems.
- Built a microcontroller-based measurement system for clinical practice, developed C++ codes for Atmel AVR microcontrollers using WinAVR and AVR Studio, and designed PCB using EAGLE and Protel (Altium Designer).
- Performed VHDL programming of Xilinx FPGA/CPLD through Xilinx Foundation 2.1i.

Panda Security (Bilbao, Spain)
Software Engineer (Contract/Part-time)   May 2005 – Oct. 2006   *Remote, Germany*
- Collaborated remotely in developing C++ codes for detecting malicious programs in Windows.
- Gained experience with the Portable Executable (PE) file format in Windows using OllyDbg and SoftICE.

Various Companies
Hardware & Software Engineer   Nov. 2001 – May 2005
- Developed programs with Visual/Borland C++ and Delphi/Turbo Pascal for industrial automation and computer numerical control (CNC) on Windows and MS-DOS for controling milling machines with G-code made by EdgeCAM.
- Programmed software applications and designed hardware interfaces for parallel & serial port, and ISA slot of IBM PCs.
- Programmed AVR microcontrollers using WinAVR & AVR Studio, as well as MCS-51 (8051) with C51ASM & Keil C51.
- Developed CPLD-based systems for reading encoders and controlling stepper motors for robotic applications.
- Developed microcontroller-based USB dongles using AVR microcontrollers (adopted from IgorPlug-USB), in addition API libraries (DLL & OCX) and device drivers in Windows for USB devices using DDK (Windows Driver Kit).
- Simulated electronic circuits using EWB (NI Multisim) and PSpice, designed them with Protel PCB (Altium Designer).

Education

Macquarie University
Ph.D. in Physics and Astronomy   2014   *Sydney, NSW, Australia*
- PhD dissertation on ionized nebulae using IFU spectroscopy, 3D kinematic modeling, plasma diagnostics, abundance analysis, and photoionization modeling. *Skills*: Data Analysis, Data Visualization, Python, FORTRAN, IDL, IRAF.

Queen's University Belfast
M.S. in Plasma Physics   2009   *Belfast, Northern Ireland, UK*
- Master's thesis on numerical analysis of electron-acoustic waves in plasmas using dispersion relations and nonlinear methods. *Skills*: Numerical Analysis, Computational Physics, Applied Mathematics, MATLAB, Mathematica.
- Notable Lectures: Theory of Plasma Physics, Experimental Plasma Physics, Laser Physics, Low-Temperature Plasmas.

University of Rostock
M.S. in Computational Electrical Engineering   2007   *Rostock, Germany*
- Master's thesis on the development of a microcontroller-based embedded measurement system using an AVR-family μC and programmable A/D converters for clinical practice. *Skills*: C++, Microcontrollers, RTOS, Embedded Systems.
- Notable Courses: Computational Electromagnetism, Computational Methods, Parallel Computing, Controller Design, Object-Oriented Programming, Application-Specific Integrated Circuits, Advanced VLSI Design, Distributed Systems.

Publications and Outreach
- **Publications**: 30+ leading-author papers, Google Scholar: a2LX8coAAAAJ, orcid.org/0000-0003-4552-5997
- Public talks (e.g., Conference Meetings, Colloquia, NASA Community Events).
- TED-Ed Education Materials: YouTube (e.g., youtu.be/iyOVbs_mO7o).