KARTHIK RAO

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EDUCATION

Rice University, Houston, TX August 2021 - Present
Ph.D. in Physics

Texas A&M University, College Station, TX August 2017 - May 2021
B.S. in Physics, B.S. in Computer Science
Minor in Mathematics, Minor in Cybersecurity
Cumulative GPA - 3.814
Honors Fellows, Magna Cum Laude, Undergraduate Research Scholar
Honors Minor in Mathematics, Honors in Physics
Thesis: *Particle Detector for Low-Energy Heavy Ions*
Thesis Advisor: Dr. Grigory Rogachev

RESEARCH EXPERIENCE

Quantum Materials - Dr. Emilia Morosan August 2021 - Present
Design, synthesis, and characterization of novel materials with unconventional electronic and magnetic ground states

Atomic Force Microscopy - National Institute of Standards and Technology May 2021 - July 2021
Performed COMSOL simulations on AFM probes to build a dataset of results using different probe shapes and to determine unknown probe shape from scanning results

Nuclear Astrophysics - Dr. Grigory Rogachev May 2019 - July 2021
Developed a parallel plate avalanche counter (PPAC) particle detector for low-energy heavy ions which will be used in experiments in nuclear astrophysics using indirect methods at the Cyclotron at Texas A&M

Deep Learning - Dr. Anxiao Jiang August 2020 - May 2021
Trained and applied a good model that can detect the target action/emotion, using (existing) datasets, to YouTube videos to find "moments" that contain the target action/emotion, and build a large and accurate dataset of such "moments"

Quantum Light-Matter Interaction - Dr. Alexey Belyanin August 2019 - May 2021
Performed independent study in quantum information where we consider interactions between qubits and quantum fields, entangled systems, dissipation and decoherence, non-trivial topological materials, topological superconductivity, and interaction of light with condensed matter systems as well as designed a theoretical cavity using magnetized graphene to create a qubit with discreet energy levels

Superconducting Magnets - Dr. Peter McIntyre May 2018 - January 2019
Collaborated to create a device that was used to align magnetic fields precisely in a Tokamak and participated in USPAS "Fundamentals of Accelerator Physics and Technology" summer 2018 session with full financial support

Molecular Gyroscopes - Dr. John Gladysz January 2018 - May 2018
Worked with the Gladysz Research Group and performed team-led research focusing on computational investigations of molecular gyroscopes using mainly atomistic simulations on supercomputers

SKILLS

Proficient in material synthesis techniques such as single crystal flux growths, chemical and physical vapor transport, high pressure laser floating zone, and polycrystalline arc-melting
Proficient in characterization techniques such as crystallography, powder x-ray diffraction, elemental analysis, scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), magnetization and specific heat measurements, electrical transport
Proficient in LaTeX, C, C++, Java, MATLAB, OriginPro, Python, HTML, CSS, JavaScript
Experience with R, Prolog, Assembly, Inventor, Verilog, VHDL, ROOT, LISE++, COMSOL
Familiar with workshop machines such as mills, band-saws, lathes etc.

PUBLICATIONS

1. K. S. Rao, "Particle Detector For Low-Energy Heavy Ions," *Explorations: The Texas A&M Undergraduate Journal*, vol. 12, pp. 74-78, Nov 2020

PRESENTATIONS AND POSTERS

1. Aug 06, 2021: The 2021 SPS Intern Symposium, "Profiling the Shape of Electrostatic Force Microscopy Probes Using Finite Element Simulations", presented by **K. S. Rao**, with J. Kopanski, and Y. Obeng
2. Apr 18, 2020: 1^{st}APS Virtual April Meeting (Q2C, 2020 Vision: Frontiers in Physics), "Delay line PPAC for low-energy, heavy ions", presented by **K. S. Rao**, with H. Jayatissa, G. Chubarian, E. Koshchiy, and G. Rogachev
3. Feb 26, 2020: 3rd Undergraduate Research Scholars Symposium, College Station, Texas, "Delay line PPAC for low-energy, heavy ions", presented by **K. S. Rao**, with H. Jayatissa, G. Chubarian, E. Koshchiy, and G. Rogachev
4. Mar 22, 2018: 21st Student Research Week (Bridging Disciplines, Engaging with Others), College Station, Texas, "Simulations of Rotational Barriers in Molecular Gyroscopes", presented by J. Joung, **K. S. Rao**, C. Woodall, with A. Ehnbom, L. M. Prez, M. B. Hall, and J. A. Gladysz

WORK EXPERIENCE

Teaching Assistant January 2022 - Present
TA for Elementary Physics Lab 2, Mechanics (with Lab)
Grader August 2019 - May 2021
Graded for physics classes such as Optics and Thermodynamics (Fall 2019), Quantum Mechanics 1 (Spring 2020, 2021), Quantum Mechanics 2 (Fall 2020)
Peer Mentor August 2018 - December 2018
Mentored incoming freshmen in College of Science through one-on-one weekly interactions and served as a sincere and positive source of support to help first-year physics students
Student Technician August 2017 - December 2017
Assisted the TA for a freshman-level Physics class

ACTIVITIES

Physics and Astronomy Graduate Student Association (PAGSA) August 2022 - May 2023
Diversity, Equity and Inclusion (DEI) Representative
Represent graduate student voices on the Physics & Astronomy Department DEI Committee, report back on DEI committee progress and initiatives, and work with PAGSA and graduate students to implement graduate student level initiatives to improve the physics graduate community culture

Society of Physics Students August 2018 - May 2021

Treasurer

Create and manage a budget of $1000, analyze budgets and financial reports regularly, ensure the organizations funding activities is in compliance with the standards set by the University, develop ideas for fundraising and aid in Department of Physics and Astronomy outreach events

Discover, Explore and Enjoy Physics (DEEP) August 2017 - May 2021

Member

Built demonstrations such as the plasma cutter, drawdio pencils, thermoelectric generator, fluid instability demonstration and so on, worked side-by-side with their peers and professors on research, concept, design, and fabrication of science demonstration experiments and presented these exhibits during the Festival, Shows, and other outreach program in teams of several students and faculty members

Corps of Cadets August 2017 - May 2021

Operations/Logistics Officer

Train freshmen, sophomore and junior cadets on class structure, ensuring knowledge of rules, responsibilities, and duties expected of them as well as organize outfit events such as the annual Christmas party, family weekend events and more

O. R. Simpson Honor Society August 2018 - May 2020

Test Bank Sergeant

Offer free one-on-one tutoring for any cadet in need, take accountability at all mandatory tutoring events for the Corps of Cadets as well as update and maintain the test bank

OUTREACH, VOLUNTEERING AND COMMUNITY SERVICE

Houston Humane Society (2022), Big Event (2018, 2019, 2021), March to the Brazos (2018, 2019), Various community service events with the Corps of Cadets, Assisted department in New Student Conferences, Physics Festival (2018, 2019, 2021), DEEP Showcase (2018-2020), Various department outreach events over the academic year and summer breaks

AWARDS

John B. Beckham Award, 2021, College of Science, Texas A&M University

Phi Kappa Phi Deans Excellence Award, 2018, College of Science, Texas A&M University

Aggie Research Scholar (Aggie Research Scholars Program), Spring 2018, Texas A&M University

Deans Honor Roll, College of Science, Fall 2017, Spring 2018, Spring 2020, Texas A&M University

Outstanding Academic Freshman, 2017-2018, Corps of Cadets, Texas A&M University

Various Academic Scholarships from departments, colleges and the university

Non-Resident Tuition Waiver, Fall 2017 - Spring 2021