Dave Austin

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Citizenship: USA

Education

Ph.D. in Physics, University of Central Florida, Orlando, FL — expected Aug 2024
M.S. in Physics, University of Central Florida, Orlando, FL — May 2022
B.S. in Physics, College of Charleston, Charleston, SC — May 2018

Research

Computational and theoretical modeling of materials — Aug 2018-present
University of Central Florida
Model materials to determine the electronic structure, and other properties using Density Functional Theory. Funded by the National Science Foundation, through Professor Talat Rahman. Using VASP and Quantum Espresso numerical modeling software I studied the adsorption characteristics of a variety of organic molecules on metallic and insulating surfaces. Also, I studied reaction mechanisms for single-atom catalysis, and molecular decomposition.

Computational modeling of neurons and neural networks — Aug 2017-May 2018
College of Charleston
Built computational models of phase response curves for single neurons and neural networks with Professor Sorinel Oprisan, under an NSF Career Award Fellowship funds. I implemented numerical solutions to the Hodgkin-Huxley Model to model neural activity. These models were used to study how different frequencies of action potentials of interconnected neurons affected each other.

Publications

1. Rezani, F., **Austin D**. *et al.* Ligand coordinated Pt single-atom catalyst allows adsorbed CO to extract oxygen from support during water-gas shift reaction." to be submitted.
2. Le D**., Austin D.**, S. Hong S., Xie F. Liu, and T. S. Rahman, "Controlling the formation of Pt single atom catalyst on CeO2(110): an ab initio thermodynamics study," to be submitted.
3. **Austin D.**, Le D., and Rahman T. S. "Dependence of electronic structure and chemical activity of singly dispersed Pt atoms on CeO_2 on its local coordination," to be submitted.
4. **Austin D.**, Barragan A. *et al* Topological states in a pseudo-kagome lattice, to be submitted.
5. Tan, W., Xie, S., Le, D. *et al.* Fine-tuned local coordination environment of Pt single atoms on ceria controls catalytic reactivity. *Nat Commun* **13**, 7070 (2022). https://doi.org/10.1038/s41467-022-34797-2
6. **Austin, D**., Oprisan, S., "A Generalized Phase Resetting Method for Phase-Locked Modes Prediction", PLOS ONE 12(3): e0174304 (2017), https://dx.plos.org/10.1371/journal.pone.0174304

Grants and Awards

- ❖ Resolv Cluster International Research Fellowship — August 2023 – December 2023
- ❖ UCF Physics Department Student of the Year Award — 2022-2023
- ❖ American Physical Society Leadership Summit — 2023
- ❖ Alliance for Graduate Education and the Professoriate — 2020 – Present
- ❖ Outstanding Undergraduate Research — 2018
  Department of Physics and Astronomy, College of Charleston
- ❖ Best Poster Presentation — Fall 2016
  A Generalized Phase Resetting Method for Phase-Locked Modes Prediction
  Authors: Dave Austin and Sorinel Oprisan, SCAS-AAPT
- ❖ HHMI Summer Research Fellowship Summer — 2015, 2017
  College of Charleston

Synergistic Activities

Conferences

- ❖ 796 WE-Heraeus-Seminar - Poster — September 2023
  - ➢ "Ligand Coordinated Pt Single-Atom Catalyst Allows Heteroatom Bond Formation During Water-Gas Shift Reaction", **Dave Austin,** Fereshteh Rezvani, Duy Le, Talat S. Rahman, Steven L. Tait

- ❖ Dynamics at Surfaces Gordon Research Conference - Poster — July 2023
  - ➢ "Ligand Coordinated Pt Single-Atom Catalyst for Hydrogen Production", **Dave Austin,** Fereshteh Rezvani, Duy Le, Talat S. Rahman, Steven L. Tait

- ❖ American Physical Society Bridge Symposium — 2023
  - ➢ "Interplay of the metal surface electronic state and non-covalent molecular bonds in synergistic molecular assembly formation on Au(111)", **Dave Austin,** Duy Le, Sara Lois, Ane Sarasola, Lucia Vitali, Talat Rahman

- ❖ American Physical Society March Meeting — 2023
  - ➢ "Interplay of the metal surface electronic state and non-covalent molecular bonds in synergistic molecular assembly formation on Au(111)", **Dave Austin,** Duy Le, Sara Lois, Ane Sarasola, Lucia Vitali, Talat Rahman

- ❖ Science & Technology of Emerging Materials Symposium 2023 - Poster — 2023
  - ➢ "Interplay of the metal surfaced electronic state and non-covalent molecular bonds in synergistic molecular assembly formation on Au(111)", **Dave Austin,** Duy Le, Sara Lois, Ane Sarasola, Lucia Vitali, Talat Rahman

- ❖ American Physical Society March Meeting — 2022
  - ➢ "CO vibrational frequencies as probe of Pt local environment in Pt_1/CeO_2 single atom catalysts: First principles investigations", **Dave Austin**, Duy Le, Shaohua Xie, Sampyo Hong, Fudong Liu, and Talat S. Rahman

- American Chemical Society March Meeting 2022
  - "Determination of Location of Pt Single Atom Catalyst on the $Ce_2O(110)$ Surface: first principles investigation", **Dave Austin**, Duy Le, and Talat S. Rahman

Leadership Experience

- APS Chapter at University of Central Florida 2023-Present
  - **Vice President**
- APS Chapter at University of Central Florida 2020-2023
  - **Founding Treasurer**
- Graduate Society of Physics Students, UCF 2019-2020
  - **Treasurer**
- APS IDEALS Committee 2020-2022
- Outreach Committee, UCF Department of Physics 2018-2021
  - STEM Day
  - Physics Career Day
  - Florida Prison Education Project

Teaching Experience August 2019-May 2020

- Teaching Assistant, University of Central Florida Department of Physics
  - Assist students in physics lab experiments.
  - Led class discussions and answer students' questions
  - Evaluate student lab reports and knowledge of physics
- Tutor
  - Tutored middle school, high school, and college students in math and science
  - Tutored Graduate students in Statistical Mechanics, and Quantum Mechanics
- Mentor
  - Guide graduate students in developing, and implementing research plans
  - Taught students the fundamentals of Ab Initio Calculations and how to perform them