AUSTEN ASHWIN GABRIELPILLAI

CURRICULUM VITAE

Current	Contact
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EDUCATION

5/2020 **Master of Information**
Rutgers University – New Brunswick
Concentration: Data Science
GPA: 3.91/4.00

5/2017 **Bachelor of Science in Engineering Physics**
University of Illinois at Urbana-Champaign
Major: Engineering Physics
Concentration: Computer Science
GPA: 3.05/4.00

RESEARCH EXPERIENCE

9/2020 – present **Independent Researcher**
Freelance

Under the Supervision of Rachel Somerville, PhD.
Responsibilities: Investigating merger history differences between semi-analytic model (SAM) and IllustrisTNG's (TNG) hydrodynamical subhalo merger trees. Post-processing raw ASCII datasets into hdf5 for compression and distribution. Developing a Python module for querying and loading partitions of a 500 GB simulation suite.

5/2019 – 8/2020 **Research Analyst**
Flatiron Institute, Simons Foundation

Under the supervision of Rachel Somerville, PhD.
Responsibilities: Investigated differences between SAM and TNG catalogs at $z = 0$ for the purpose of building an TNG-like SAM. Ran the Rockstar and Consistent-Trees algorithms on the TNG simulation suite to generate halo catalogs and merger tree histories. Ran the Santa-Cruz SAM on high resolution merger tree catalogs to generate three subhalo catalogs. Verified SAM results by comparing scaling relations to a Bolshoi-Planck SAM run in a Jupyter Notebook. Compared and analyzed the differences between the SAM's subhalo

catalog to TNG's Subfind catalog through statistical comparisons and subhalo matching.

10/2019 – 5/2020 **Independent Study**
Fundamentals of Data Science, Rutgers University – New Brunswick

Under the supervision of Michael Lesk, PhD
Responsibilities: Created bijective subhalo matches between Rockstar and Subfind halo catalogs using the SubLink algorithm. Obtained particle IDs by using a combination of Rockstar member functions and C wrappers. Converted Rockstar outputs to a mock Subfind hdf5 catalog using Python. Ran SubLink to create bijective subhalo matches between Rockstar to IllustrisTNG dark matter-only and full particle runs across 90+ snapshots for ten simulations. Wrote a Python script to verify match outputs both analytically and visually.

5/2016 – 8/2016 **Research Intern**
Atomic Physics Group, Technische Universität Darmstadt

Under the supervision of Zoran Andelkovic, PhD, and Wilfried Nörtershäuser, PhD
Responsibilities: Participated in high- and low-energy physics research investigating ion beam properties in particle accelerators at GSI Helmholtz Center for Heavy Ion Research. Regularly utilized lab equipment, including vacuum pumps, ion sources, high voltage appliances, and oscilloscopes. Manipulated accelerator components and took diagnostics along a 15-meter beam line. Directed ion beams along 100 meters of beam line as part of a facility wide development project. Analyzed 83 samples using OriginLab and Microsoft Excel to analyze particle beam quality. Created a script in LabVIEW allowing for instantaneous channel switching between FPGA cards as part of the development of a GUI.

PROJECT EXPERIENCE

10/2018 – 5/2019 **Illustris Subhalo Visualizer**
Flatiron Institute, Simons Foundation

Responsibilities: Developed software for the purpose of visualizing Illustris subhalos under the guidance of Shy Genel, PhD. Utilized a Python flask server for reading and converting hdf5 data to JSON. Built an interactable 3D visualization tool for subhalos at the particle level using Three.js. Connected the 3D graphic to a 2D heatmap built with D3.js. Added the ability to switch between particle types and fields. Overlaid a contour map on top of the heatmap for visualizing a secondary field.

7/2018 – 5/2019 **Astrosims**
Flatiron Institute, Simons Foundation

Responsibilities: Contributed to the development of an online repository of astronomy simulation data alongside Dylan Simons, PhD, and Elizabeth Lovero. Overhauled bar charts and implemented heatmap visualizations using Highcharts.js. Maintained and generated website elements such as URL querying using TypeScript and Haskell. Updated a YAML catalog containing simulation fields and metadata. Documented functions for an associated Python module.

1/2015 – 5/2015 **Orchestral Zombie Apocalypse**
Computer Science Honors Seminar, University of Illinois

Responsibilities: Served on the development team for the Unity game Orchestral Zombie Apocalypse as a combat and audio developer. Overhauled 2 outdated combat scripts in C# by resolving audio storage and playback issues. Implemented a prototype chord combo system. Designed a procedural music system by utilizing Markov chains to emulate music theory as well as be user responsive. Added end user features such as key signature selection through key input. Became familiar with revision control such as GitHub. Demonstrated the product to multiple audiences.

VOLUNTEER & COMMUNITY INVOLVEMENT

General & Service Team Member
University of Illinois Black Chorus, University of Illinois

1/2015 – 5/2017 General Member Responsibilities: Served as a member of the University of Illinois Black Chorus bass section. Assisted individuals with learning music through oral tradition. Volunteered at university ceremonies.

1/2017 – 5/2017 Service Team Responsibilities: Managed all technical aspects of the biennial symposium conference as Technology Manager. Assisted patrons with audio and visual display. Transcribed lyrics live for attendees. Coordinated a 6-person infrastructure team to assist with stage preparation. Set up and took down speakers and microphones for rehearsal twice a week.

9/2014 – 5/2015 **3C Fire Marshal**
Allen Hall Safety Coordinator Committee, Allen Hall, Urbana, IL

Responsibilities: Took part in prototype committee dedicated to hall safety. Planned two educational general safety activities with other committee members. Attended seminar regarding fire safety control and management.

1/2014 – 8/2014 **Opening Program Committee Chair**
Allen Hall Orientation Committee, Allen Hall, Urbana, IL

Responsibilities: Directed, wrote, and edited the orientation video for incoming freshmen. Oversaw a team of 10 volunteers for rehearsing and filming under a time constraint of one month. Organized and executed four informative presentations on different aspects of campus life with Microsoft PowerPoint. Provided tours of campus and the dorm to help familiarize freshmen. Acted as a substitute member in other committees when short on staff.

SELECTED COURSEWORK

Quantum Physics I	Statistics and Probability I	Information Visualization
Electromagnetic Fields I	Introduction to Differential Eqs.	Problem Solving with Data
Modern Experimental Physics	Applied Linear Algebra	Machine Learning in D.S.
Classical Mechanics II	Data Structures	Database Design and Mgmt.

SKILLS

Programming	**Python, JavaScript, HTML & CSS, R, Bash, TypeScript, Haskell, SQL, Java, C, C#, C++, LaTeX, LabVIEW**
Software	**Jupyter Notebook, Unity, Microsoft Office (Word, Excel, PowerPoint), Eclipse, Brackets, OriginLab, TinkerCAD**
Revision Control	**Subversion, GitHub**
Operating Systems	**Windows, Linux, Mac OS**