CURRICULUM VITÆ

# Daniel Gause

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## Education

**B.A. in Physics and Mathematics** *September 2016 – May 2020*
*Middlebury College*

- Double major in Physics and Mathematics, GPA: 3.5, cum laude
- Physics Thesis: Structural Analysis of Potential DQSO Pairs
- Mathematics Thesis: An Introduction to Large Deviation Theory
- Study Abroad: Trinity College Dublin – Fall 2018

## Professional Experience

**Data Scientist** *May 2021 – Present*
*Accenture Federal Services*
Member of the Discovery Lab, a small team of data scientists solving the hardest data problems at AFS. Built and maintained dozens of full-stack ML/AI packages. Led small teams on research-driven projects.
***Selected Projects***

- Maritime Vessel Pattern-of-Life Classifier
  - Developed an ML pipeline trained on historical NASA satellite imagery data to predict wildfire, flood, and landslide risks, enabling ESG monitoring and impact management of climate change effects on natural resources for IDB Invest in Latin America.
- Synthetic Data Generator
  - Lead developer of microservice Python package that automatically generated a synthetic datascape based on PII data, utilizing NLP, LLMs, and retrieval-augmented generation
- United Network for Organ Sharing Predictive Analytics
  - Built, tested, and deployed a CI/CD ML pipeline using survival analysis machine learning predictive models trained on >10M rows using Apache Spark to predict kidney transplant waitlist survival time
- E. Coli Outbreak Predictor
  - Developed a pipeline using DBSCAN to spatiotemporally cluster CDC and NOAA weather data and trained a Random Forest to predict localized E. coli outbreaks from tropical storms

**Senior Thesis on Dual Quasar Candidate Morphologies** *September 2019 – December 2019*
*Department of Physics, Middlebury College*

- Performed a structural analysis on the three most promising dual quasar (DQSO) candidates from preceding summer research by modeling the host galaxy morphologies
- Generated candidate-specific PSFs using TinyTim and fitted a set of surface brightness models to each candidate with GALFIT and F-tests
- Identified the most likely morphological combination for each candidate, ultimately rejecting the DQSO nature of two candidates, with inconclusive results for the third
- Further study needed to confirm hypothesis of DQSOs historically misclassified as single QSOs

**Searching for Dual Quasars in Archival Hubble Data** *May 2019 – August 2019*
*Department of Physics, Middlebury College*

- Hypothesized that many high redshift DQSOs might have been misclassified as single QSOs
- Wrote a Python MAST search algorithm to find candidate DQSO systems in the HST archive using brightness contour maps
- Built a retrieval and reduction pipeline for ACS and WFC3 data (Python, R, TOPCAT)
- Identified 21 objects that exhibited DQSO morphological characteristics

## Volunteer Experience

**Image Reduction Pipeline Development Volunteer** *December 2024 – Present*
*University of California Observatories*
- Assisted in the development of an automated astronomical data processing pipeline for Lick Observatory's Nickel Telescope
- Built astronomical image reduction tutorials in python for observatory outreach

**Scientific Computing Volunteer** *May 2024 – Present*
*California Academy of Sciences*
- Assisted in the development of parallel processing for a citation finder application
- Utilized NLP and spatiotemporal clustering techniques to analyze historical specimen data

**Service Learner Volunteer** *August 2024 – January 2025*
*City College of San Francisco*
- Helped plan and host public sky viewing nights and planetarium shows every month

## Presentations and Posters

**Undergraduate Symposium on Research in Astronomy** *October 2019*
*KECK Northeast Astronomy Consortium Symposium at Vassar College*
- On the Hunt for Dual Quasars

**Middlebury Summer Research Poster Session** *July 2019*
*Middlebury College*
- Searching for DQSOs in Archival Hubble Data

## Skills

- **Programming:** Python, R, shell, SQL, Java, HTML/CSS, MATLAB
- **Analysis:** Astropy, Pandas, Astroquery, Apache Spark, Dustmaps
- **Software:** Docker, TOPCAT, Git, DS9, IDL, GALFIT
- **Machine Learning:** Keras, PyTorch, Tensorflow, scikit-learn, AstroML

## Additional Experiences

**Stellar Evolution Course** *August 2024 – December 2024*
*City College of San Francisco*
- Astronomy course with Professor Claia Bryja through the Free City CCSF program

**Cataclysmic Variables Research Project** *August 2024 – Present*
*City College of San Francisco*
- Ongoing observational research project led by Professor Claia Bryja monitoring CV star, AY Piscium. Collected reduced and processed data from the Nickel telescope at Lick Observatory

**BALQSO CNN Classifier – Personal Project** *December 2023 – April 2024*
- Developed a Broad Absorption Line Quasar (BAL QSO) classifier using a Convolutional Neural Network (CNN)
- Retrieved spectra for the entire SDSS DR16 quasar catalog, removed a non-BAL QSO continuum from each QSO, custom fit to each spectrum by PCA-derived Eigen-spectra, masking BAL features identified by a custom trough-detection algorithm

**Quasar Buddy – Personal Project** *April 2024 – Present*
- Created app that retrieved, chunked, and ingested quasar-related arXiv articles into pgvector database. Developed user friendly question-answer chatbot interface driven by RAG enhanced LLMs using langchain