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Ryan Low

I am a third-year Physics Major with Astrophysics Specialization from the University of California, San Diego who is enthusiastic about physics, computers, astronomy, and learning. I currently research with Dr. Adam Burgasser and his Cool Star Lab at UCSD, working with Optical Spectral Data.

Education

2016-Present B.S. in Physics with Astrophysics Specialization at University of California, San Diego.
Major GPA: 3.7.
Expected Graduation date: June 2020.

Relevant Coursework - Completed

PHYS 100A Electrostatics. Solutions to boundary value problems using the Method of Images, Separation of Variables, and Multipole Expansions in configurations with conducting and dielectric materials.

PHYS 110A Advanced Classical Mechanics I. Introduction to the Lagrangian mechanics, the Two-Body Problem, and Coupled Oscillators.

PHYS 105A Mathematical Methods for Physicists. Introduction to Fourier Analysis, Complex Analysis, and Boundary Value Problems for Poisson's Equation, the Heat Equation, and the Wave Equation.

PHYS 4E Introduction to Quantum Mechanics. Schrödinger's Equation in 3D, the Harmonic Oscillator potential and Operator Algebra, Orbital and Spin Angular Momentum Algebra, Matrix Mechanics using Spin 1/2 Systems, Density Matrices, and Statistical Mechanics of the Two State System.

PHYS 4D Introduction to Special Relativity and Electrodynamics. Solutions to Maxwell's Equations in vacuum, Lorentz Transformations, 4-vectors, and Lorentz transformation of Electromagnetic fields.

PHYS 4C Introduction to Electricity and Magnetism. Electrostatics, Magnetostatics, linear DC circuits, AC circuits.

Relevant Coursework - In Progress

PHYS 100B Magnetostatics. Solutions to boundary value problems for magnetic vector potential in configurations with magnetic media.

PHYS 110B Advanced Classical Mechanics II. Non-inertial frames, rigid body dynamics, dynamical systems, continuum mechanics, and chaos.

PHYS 105B Computational Physics. Solutions to Partial Differential Equations through Eigenmode Analysis, WKB analysis, nonlinear PDEs, and Simulation Methods

Projects

Lick/KAST Data Reduction Pipeline
: I am currently responsible for creating a data reduction and analysis pipeline of Lick/KAST data for Dr. Burgasser's Cool Star Lab. The Lick/KAST spectrograph produces optical spectral data from the Brown Dwarfs that we observe. This project is to develop tools to process the raw data into spectrum that we can analyze, and then to develop tools to analyze the spectra.

CHARM-KASTr
: The Crude Homemade Astronomical Reduction Module for KAST red. The spectrum reduction package that I am developing using Python for the Lick/KAST Data Reduction Pipeline.

IRTF SpeX Data Reduction Pipeline
: I assisted in streamlining the data reduction process for IRTF SpeX data. The IRTF SpeX spectrograph produces infrared spectral data from the Brown Dwarfs that we observe. I developed protocols, tools, and instruction manuals for using the reduction software SpeXTool to process SpeX data.

GetFITSHdr
: A Python script for scraping header data from .fits files and placing into .xlsx files. This script creates automatic log files from IRTF SpeX data, which streamlines the process of data reduction.

XlCombine
: A Python script for collating many .xlsx files with similar columns. Written for Spectrum Sports to streamline their database pipeline.

Proficient Programming Languages

Python
: My go-to language. Used in the majority of my projects, personal and professional.

Mathematica
: I use Mathematica mainly for computer algebra and for some numerical computations.

Java
: My preferred language for personal projects that require a Graphical User Interface

LyX
: A document processing program that allows for a more intuitive way to write LaTeX.

LaTeX
: I typeset all of my mathematics and physics documents in LaTeX.

Interests

Building and Fixing Computers
: I love to tinker with technology. I am currently playing around with Android systems, Linux systems, and a Raspberry Pi. In the past, I have also experimented with Arduino and software modifying a Wii.

Tutoring and Teaching
: The best way to understand a subject is to teach it to others. I greatly enjoy helping my classmates come to a better understanding of their subjects.

Amateur Astronomy
: I have an immense passion for the night sky and the stars. I currently only own a small telescope, but I have taken several trips to the Mt. Wilson Observatory to observe the night sky and to observe the 2017 Solar Eclipse.

Model Rocketry
: During high school, I created and lead a model rocketry club that competed in the Team America Rocketry Challenge from 2012 to 2016. I also won second prize in the AIAA's Student Payload and Rocketry Challenge in 2014 for my research project and presentation. To this day, I still practice model rocketry with a continuing high-power certification from the National Association of Rocketry.

References

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