Carlos Carrillo-Gallegos

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EDUCATION

Yale University, New Haven, CT — May 2022
BS in Astrophysics

Awards: Yale STARS II Research Fellow (~15 students) for research with Dr. Hector Arce, UChicago Leadership Alliance Summer Research Fellow for research with Dr. Hsiao-Wen Chen

Presentations: *The Impact of the M43 HII Region on the Orion A Molecular Cloud* (Yale Astronomy Dept. 2022, Yale STARS II Symposium, American Astronomical Society National Meeting 2022–Canceled due to COVID), *Characterizing Gas Flow Using Multiply Lensed Quasars* (Leadership Alliance Symposium 2021)

References:

Dr. Arlene Fiore, *Massachusetts Institute of Technology* — Phone: (617) 324-6712 . Email: amfiore@mit.edu
Dr. Hector Arce, *Yale University* — Phone: (203) 432-3018 . Email: hector.arce@yale.edu
Dr. Hsiao-Wen Chen, *University of Chicago* — Phone: (773) 702-8747. Email: hchen@astro.uchicago.edu

SCIENCE RESEARCH EXPERIENCE

MIT Air Quality Modeling Research Associate(40hrs/week), Cambridge, MA — Sep. 2022-Present

- Implementing a Bayesian Statistical Ensemble method to combine datasets of several different pollutants (NO_2,$PM_{2.5}$,O_3) in order to create more accurate pollutant exposure models for the northeast United States which will be used in public health studies on the impact of air pollution on human health.

Astronomy Researcher with Professor Hector Arce (7hrs/week), New Haven, CT — Sept.2019-May 2022

- Researched, quantified, and visualized the physical properties of the M43 HII region (a nearby cloud of ionized gas), including its mass, pressures, velocity, kinetic energy, and momentum. Collaborated directly with Dr. Arce.
- Developed code into a Python package to determine the same physical properties of any other HII region, enhancing reproducibility and future study of other regions.
- Authored a 20 page report communicating research and delivered two 15 minute presentations at Yale symposiums.

University of Chicago Summer Research Assistant in Astronomy(35 hrs/week), Chicago, IL — June 2021- August 2021

- Investigated galaxies lensed by WFI-2033, a multiply lensed quasar illuminating galaxies in its foreground.
- Created a Python script to extract spectra of a galaxy, perform a Chi-Square minimization, and find the appropriate redshift of the galaxy = 1.1676. Result allowed for the study of how gas around the galaxy moved relative to it.
- Determined that the majority of gas was not significantly shifted from the galaxy by analyzing absorption spectra of six tracing gasses and applying gaussian fits to the data. Research provides the basis for further study of how gas surrounding galaxies affect galaxy evolution. Code can be easily applied to other galaxies.

CLASS, WORK, AND VOLUNTEER EXPERIENCE

GIS Project, *Class Assignment*: Implemented image classification methods to track loss of natural and conservation land in Southern Mexico City between 2000 and 2020.

Yale Academic Strategies Program, *Mentor*, New Haven, CT — Sept. 2020-Present

- Mentored groups of first-years and sophomores transitioning to academic and social life at Yale.
- Assisted sophomore group in identifying and applying to summer physics research programs.

Matriculate, *Advising Fellow*, New Haven, CT — November 2018-May 2020

- Advised low-income high school students applying to and enrolling in competitive colleges.

SKILLS AND INTERESTS

- Programming: Python (Advanced), MATLAB (Intermediate), Numerical Methods (Intermediate), C/C++(Beginner)
- Software: ArcGIS/ENVI (Intermediate), GlueViz(Intermediate),DS9/CARTA(Advanced)
- Personal Interests: Fiction Writing, Board Games, Basketball, Math, Running, Sitcoms, Soccer, Geography