Diego López Gutiérrez

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Education

Macalester College, Bachelor of Arts, *St. Paul, MN*. Sept 2017–Present

- Major 1: Physics, Major 2: Mathematics, Minor: German Studies.
- GPA: 3.90, Major 1 GPA: 4.00, Major 2 GPA: 3.90
- Advisors: Dr. Tonnis ter Veldhuis, Dr. John M Cannon.

Research Experience

Fermi National Accelerator Laboratory, SIST Intern, *Batavia, IL*. May 2019–Aug 2019

- **Supervisor: Dr. Wanwei Wu | wwu@fnal.gov**
- Developed an electron neutrino (ν_e) charged current (CC) interaction identification algorithm using `C++` and `ROOT` within a `LArSoft` framework.
- Goal: Correctly identify electron showers from liquid argon (LAr) time projection chamber (TPC) data using Monte Carlo simulations from the Deep Underground Neutrino Experiment (DUNE) Far Detector for future ν_eCC analysis.
- Designed and fabricated a gallery of shower profile templates for different particles and energies. Analyzed templates for likelihood calculation of particle hypothesis. Future steps: feed likelihoods into an Artifical Neural Network for electron shower identification.
- Displayed and communicated preliminary results at the MicroBooNE Collaboration Meeting in July 2019, at the Fermilab community during final poster and oral presentations in August 2019, and at the SACNAS National Diversity in STEM Conference in October 2019.

Macalester College, Undergraduate Researcher, *St. Paul, MN*. June 2018–Aug 2018

- **Supervisor: Dr. John M Cannon | jcannon@macalester.edu**
- Reduced, imaged and analyzed Very Large Array (VLA) data of selected groups of galaxies called Hickson Compact Groups.
- Goal: Examine the neutral hydrogen (HI) deficiency in each galactic system for evolutionary study.
- Investigated the morphology and dynamics of the HI gas components for each group by using the Common Astronomy Software Applications package (`CASA`) and the Karma visualization program `kvis` for data analysis.
- Delivered results at the Macalester College Summer Research Poster Presentation in September 2018 and at the 233rd American Astronomical Society (AAS) meeting in January 2019.

Awards and Academic Achievements

Astronomy and Astrophysics, *Evolution of compact groups from intermediate to final stages*. Nov 2019

- Co-Author: Jones, M. G., Verdes-Montenegro, L., Damas-Sagovia, A. *et al.* **Evolution of compact groups from intermediate to final stages - A case study of the H I content of HCG 16**. A&A 632 A78 (2019). DOI: 10.1051/0004-6361/201936349.

Alan Alda Center for Communicating Science, Making the Choice to Connect, *St. Paul, MN*. Oct 2019

- Developed science communication skills at the Plenary and Extended Sessions workshops based on the Alda Method ©, a sequence of improvisational theater techniques developed to help scientists speak more vividly and expressively about their research.

SACNAS National Diversity in STEM Conference, Poster Presentation, *Honolulu, HI.* Oct 2019

Chan Zuckerberg Initiative, CZI Full Conference Scholarship, *Honolulu, HI.* Oct 2019

- Awarded to cover the transportation, lodging and registration costs of attending the SACNAS 2019 conference.

MicroBooNE Collaboration Meeting, Oral Presentation, *Batavia, IL.* July 2019

233rd American Astronomical Society Meeting, Poster Presentation, *Seattle, WA.* Jan 2019

Macalester College, Charles J. Turck Presidential Honor Scholarship, *St. Paul, MN.* Sep 2017–Present

- Awarded to international students who show special potential to excel academically and contribute significantly to the Macalester Community.

Macalester College, Dean's List, *St. Paul, MN.* Sept 2017–Present

- Award bestowed upon full-time students whose semester GPA exceeds 3.75.

British-Peruvian Cultural Association, Excellency Scholarship, *Lima, Peru* July 2015

- Awarded a full scholarship to study English for a month in London for achieving one of the top grades in the Cambridge English: First (FCE) exam from the University of Cambridge.

Relevant Coursework

In Progress, *St. Paul, MN.*

- Quantum Mechanics, Representation Theory, Introduction to Statistical Modelling.

Complete, *St. Paul, MN.*

- General Relativity, Astrophysics, Algebraic Structures, Computational Linear Algebra, Electromagnetic Theory, Modern Physics, Real Analysis, Mechanics, Laboratory Instrumentation, Discrete Mathematics, Calculus 3, Linear Algebra.

Online

- Neural Networks and Deep Learning (in progress, deeplearning.ai, Coursera), Introduction to Differential Equations (cert., MITx, edX), Cosmology (cert., ANUx, edX), Introduction to Computer Science and Programming Using Python (cert., MITx, edX), Introduction to Aerospace Engineering: Astronautics and Human Spaceflight (cert., MITx, edX), 18.01 Single Variable Calculus (MIT OpenCourseWare), 18.02 Multivariable Calculus (MIT OpenCourseWare.)

Fermilab, *Batavia, IL.*

- International Neutrino Summer School (Aug 5 - 16, 2019), Neutrino University (June 4 - Aug 14, 2019), Undergraduate Lecture Series (June 18 - Aug 8, 2019.)

Computer and Laboratory Skills

Computer Skills

- `C++`, `ROOT`, `LArSoft`, `Python`, `Wolfram Mathematica`, `Bash`, `R`, `CASA`, `LabView`, LaTeX, MS Excel, MS Word, MS PowerPoint.

Instrumentation

- Analog electronics for computer interfacing, standard data acquisition methods (including GPIB), data analysis methods (statistics, curve fitting, etc.), standard instrumentation (lock-in amplifiers, digital oscilloscope, digital multimeter, etc.)

Work Experience

Macalester College, Preceptor for PHYS 443 Electromagnetic Theory, *St. Paul, MN*. Sept 2019–Dec 2019

- Advised students six hours per week regarding the course content and solved their doubts by guiding them towards a solution.

Macalester College, Physics Tutor, *St. Paul, MN*. Jan 2019–May 2019

- Aided undergraduate students with their homework from introductory and intermediate level Physics and Astronomy courses.
- Engaged with the students during the problem-solving process by balancing their independent thinking with constructive criticism. Overall, the students left feeling a better sense of understanding of the course content.

Macalester College, Grader for PHYS 227 Principles of Physics II, *St. Paul, MN*. Sept 2018–Dec 2018

Annan Institute for Global Citizenship, Front Desk & Projects Assistant, *St. Paul, MN*. Sept 2017–May 2019

- Organized International Roundtable 2017 and International Roundtable 2018, a series of events and discussions of public interest that are held for three days across campus, with the support of the staff at the Institute for Global Citizenship.
- Created a welcoming environment for visitors by maintaining a constantly-replenished coffee bar and greeting and assisting visitors with any questions.

Independent, Physics and Math Tutor, *Lima, Peru*. April 2017–June 2017

- Taught Physics and Math online to seniors in Venezuela and the Dominican Republic who were preparing for the IB and SAT Physics exams.
- Crafted my own teaching material and coded a total of 133 mechanics, electromagnetism, and optics problems (plus solutions) for my students.
- Taught myself LaTeX and how to use packages like TikZ, CircuiTikZ, siunitx, etc.

Activities and Interests

Physics and Astronomy Club, President (2019-20) and Treasurer (2018-19), *St. Paul, MN*. Sept 2018–Present

- Ran the club's meetings and events throughout the academic semester with a focus on building community within the department and among students.
- Organized the visit of Dr. Nicole Cabrera Salazar, CEO of Movement Consulting company. Dr. Cabrera visited campus to do a student workshop titled *Combating the Imposter Syndrome*, as well as to present her seminar titled *Our Complicity in the Leaky Pipeline* to faculty in the STEM disciplines. The purpose of this visit was to provide a dialogue about **diversity and inclusion** within the STEM disciplines and how our actions (or inactions) affect the students and the community. As president, I coordinated with my other team members and Dr. Cabrera for 8 months to prepare her visit. This included meeting with and presenting to department chairs, student government and other offices across campus to get financial support, organizing the logistics of Dr. Cabrera's stay, publicizing the event on social media and preparing flyers to distribute throughout campus.

2nd Annual Wakandacon Conference, Fermilab Booth Volunteer, *Chicago, IL*. July 2019

- Conducted demos for children and the general audience that highlighted important scientific principles such as electromagnetism and mechanics.
- Provided information about internship and educational opportunities at the lab to interested high school students and to the general public.

Macalester New Student Orientation, Orientation Leader, *St. Paul, MN*. Aug 2019

- Led 17 first-year students of the Macalester College Class of 2023 into their first few weeks of college life. This included moderating group discussions and mentoring students on one-on-one sessions.

Latinx Cultural Organization ¡Adelante!, Member, *St. Paul, MN*. Sept 2017–Present

International Identity Collective, Member, *St. Paul, MN*. Sept 2018–Present

Men of Color Collective, Member, *St. Paul, MN*. Sept 2019–Present

Languages

Spanish. Native speaker. | English. Fluent. | German. Advanced.