UREP-C

FINAL SYMPOSIUM

UNDERGRADUATE RESEARCH EXPERIENCE PURDUE-COLOMBIA 2021

UNIVERSIDAD
NACIONAL
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ABOUT UREP-C
BOGOTÁ

UREP-C is a program aimed at undergraduate students at Universidad Nacional de Colombia, which focuses on providing individual research experiences of six months at Purdue University. Currently, this program is open to undergraduate students from any area of knowledge at Universidad Nacional de Colombia, who are motivated to be part of a research project.

Students participating in the program have access to a stay with specialized study groups at the West Lafayette Campus of Purdue University in Indiana, USA. They are accompanied by an outstanding faculty from the U.S. institution, who takes on the role of mentor and provides the necessary tools to carry out the project, and another, from Colombia, who monitors the progress of the work. The projects carried out in the program cover all areas of knowledge and study problems of interest to the countries.

This program is an opportunity to strengthen research in Colombia with an international focus; through this alliance between Purdue University, Universidad Nacional de Colombia and the student, this unique experience of international mobility is made possible, which generates transformative projects, increases the quality of education in the country and makes social inclusion a reality.

The program has been directed to students from the Bogotá campus and recently students from the Medellín campus. The program continues to expand in order to provide this opportunity to more students. Now it is also directed to PEAMA (Special Program for Admission and Academic Mobility) and graduate students from the Bogotá campus.

ABOUT UREP-C

MEDELLÍN

Purdue University, on behalf of its School of Engineering, and the Universidad Nacional de Colombia Medellin campus desire to enrich their respective academic and research programs in perspective, to strengthen and expand the mutual contacts between both Universities. To achieve these objectives the parties joined the Undergraduate Research Experience Purdue-Colombia (UREP-C program).

This agreement was signed between the School of Mines and Purdue University in 2019, the first 4 undergraduate students were selected to participate in this program, a partnership between both universities. These students, along with the group of students from the Bogotá campus, are doing a research internship at Purdue University in West Lafayette, Indiana, thanks to the call of the Vice-Deanship of Research and Extension (VIE), - Women Scientists - UREPC (Undergraduate Research Experience Purdue Colombia).

The students will be able to do their internship in various research topics that "have to do with data science, innovation, administrative engineering, civil engineering and environment. We are the largest in the top 10 of engineering schools in the United States and our students are very well trained from the technical and professional to the personal; so there are many opportunities for Colombian students," said Mung Chiang '2019, Executive Vice President of Purdue University for strategic initiatives and The John A. Edwardson Dean of the College of Engineering.

"This is the first step to reactivate an old relationship and undoubtedly represents a great opportunity because the University brings together all areas of knowledge and they are very interested in Colombian talent," said Verónica Botero Fernández in 2019, Dean of Facultad de Minas.

On the right, Mung Chiang, Executive Vice President, Purdue University. On the left, Verónica Botero, Dean of Facultad de Minas.

UREP-C 2021 STUDENTS PORTRAIT PHOTO - MARCH 27th, 2021

SPECIAL LETTER TO UREP-C SPONSORS

It is essential to highlight the formation provided by Universidad Nacional de Colombia by cultivating students with a critical thinking. This allows them to act responsibly in the light of the trends and needs of the contemporary world and to lead processes of change.
Due to the nature of the institution aimed at promoting higher education and the development of research, it has been possible to strengthen academic networks.

Both Purdue University and Universidad Nacional de Colombia are committed to research, affirming the way in which it contributes to the advancement of human knowledge. For this reason, it is relevant to thank those parties that have allowed the link between both institutions to be created.

There are several actors in charge of carrying out the execution process of the program, however, it is specifically relevant to highlight the work done by those units in charge of being advisory bodies of the universities by promoting internationalization and the formal opening of national and international cooperation scenarios.

In principle, the work carried out by the Office of International Relations at the Bogotá Campus has been of great magnitude due to its efforts to obtain the definitive budget allocated to the program. We would like to highlight the work done by Professor Nancy Rozo and Antonio Fruccio. From the beginning, they have been the people in charge of giving all their effort to make the program possible. In addition to obtaining the budget for this initiative, they provide constant guidance to the students in their exchange process. Likewise, it is a potential task for the Medellin Campus and those interested in being part of this great initiative.

On the other hand, the Colombia Purdue Partnership, in each launching, works in the identification of professors. Purdue University professors who are committed to Colombian education and the engagement of students to achieve academic growth and support in assigned research.

It is evident how these actors facilitate inter-institutional relations. By articulating their international dynamics with the strategic policy initiatives proposed by the institutions and guaranteeing quality and positioning. Their work and support has been flawless and constant. They always present an optimal solution for any situation presented.

Juan Diego Velasquez, as the UREP-2020-2 generation, we want to recognize and highlight the way in which you have permanently been an integral part of this program. Without your support the development of this project would not be possible. Your work goes beyond your role as director of the Colombia Purdue Partnership, as you have always been committed to doing everything possible to help students have an opportunity to fulfill their dreams.

In this specific convocation, we were able to see the commitment and dedication to move forward the plans of multiple students. We are aware that due to the pandemic, the processes were challenging and difficult. However, despite the adversities, your work was impeccable as always.
With your support, it has been possible to develop and strengthen a research network by promoting Colombian talent throughout Purdue University.

Because of you we have been able to develop our human and research capabilities. Your confidence in our work and your ability to guide us have been an invaluable contribution. With this experience, in addition to training as researchers, we have developed our personal and professional spheres. We would also appreciate your kindness and availability during our internship, in which we had all the professional and logistical support to achieve our goals.

Therefore, we not only want to thank you but to highlight to future generations how the support of one person can change the lives of many people.

We believe in rewards, for our part we will continue on our way leaving your name high and mentioning the UREP-C program as a significant stage in our lives.

CONTENT

COLLEGE OF ENGINEERING

COLLEGE OF SCIENCE

COLLEGE OF ENGINEERING

Theylor Andrés Amaya Villabon

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Mechanical engineering

Kevin Trumble (Purdue Advisor)
Liz Karen Herrera Quintero (UN Advisor)

High resistivity electrical steels: design, obtaining and characterization of soft magnetic alloys

During my research stay within the Urep-c Program, I worked for Professor Trumble's research group at the School of Engineering Materials in the development, obtaining and characterization of soft magnetic alloys.
These alloys are key to the power transformation industry due to their magnetic and electrical properties that are suitable for use in the core of transformers and stators of electric motors and generators.
The main objective of my research was to study the influence of the gradual replacement of Si by Cr in Fe-Si electrical steel alloys, considering the electrical, magnetic and mechanical properties of the alloy.
Initially the alloys were designed by means of commercial restrictions found in the state of the art, to later be obtained by electric arc melting, these alloys were subjected to tensile testing to obtain mechanical properties, electrical resistivity measurement by means of the four-wire resistance measurement, and semi-quantitative chemical analysis with Energy-dispersive X-ray spectroscopy.
Working in this project has helped me greatly to expand my boundaries in learning enabling me not only to find my passion towards research; but also, to realize the importance of stringency and discipline it needs.

COLLEGE OF ENGINEERING

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Civil engineering

Gkritza Konstantina (Purdue Advisor)

Sonia Cecilia Mangones Matos (UN Advisor)

Assessment of Charging Technologies for Electric Buses In The BRT Public Transportation System In Bogota, Colombia

In my research experience at Purdue University, I had the opportunity to work with the Sustainable Transport System Research Group (STSRG) at Lyles school of Civil Engineering. During my time here I was under the tutelage of the group leader Dr. Gkritza.

I was able to collaborate on their SoS project, which is focused on gaining a deeper understanding of technical, behavioral and socioeconomic aspects that impact market adoption of emerging and transformative technologies, such as transportation electrification. This experience allows me not just to become well acquainted with the main features of electric vehicles, but also to explore other fields like the user's behavioral intention to use existing transportation choices, public policies and strategies to promote electric vehicles adoption. In this sense, my participation there enriched me at both professional and personal level, and also led me to affirm my intention of finding out what its need is to improve the quality of life through transportation.

At the same time, I developed my own research regarding charging electric buses technologies in Bogota´s public transport system, by a large literature review of current available charging technologies and study cases, with given manuscripts, recommended authors and previous products developed by the research group. These projects will enable a more accurate estimation of the anticipated impacts of such technologies and, consequently, make the sustainable transformation of our mobility.

To Be part of the UREPC program, changed the way I see my research passion: to reach the truly purpose-designed transportation systems, and be able to investigate it, while I had a whole new range of experiences that go hand in hand with the purposes of the program beyond the academics aspects.

COLLEGE OF ENGINEERING

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Civil engineering

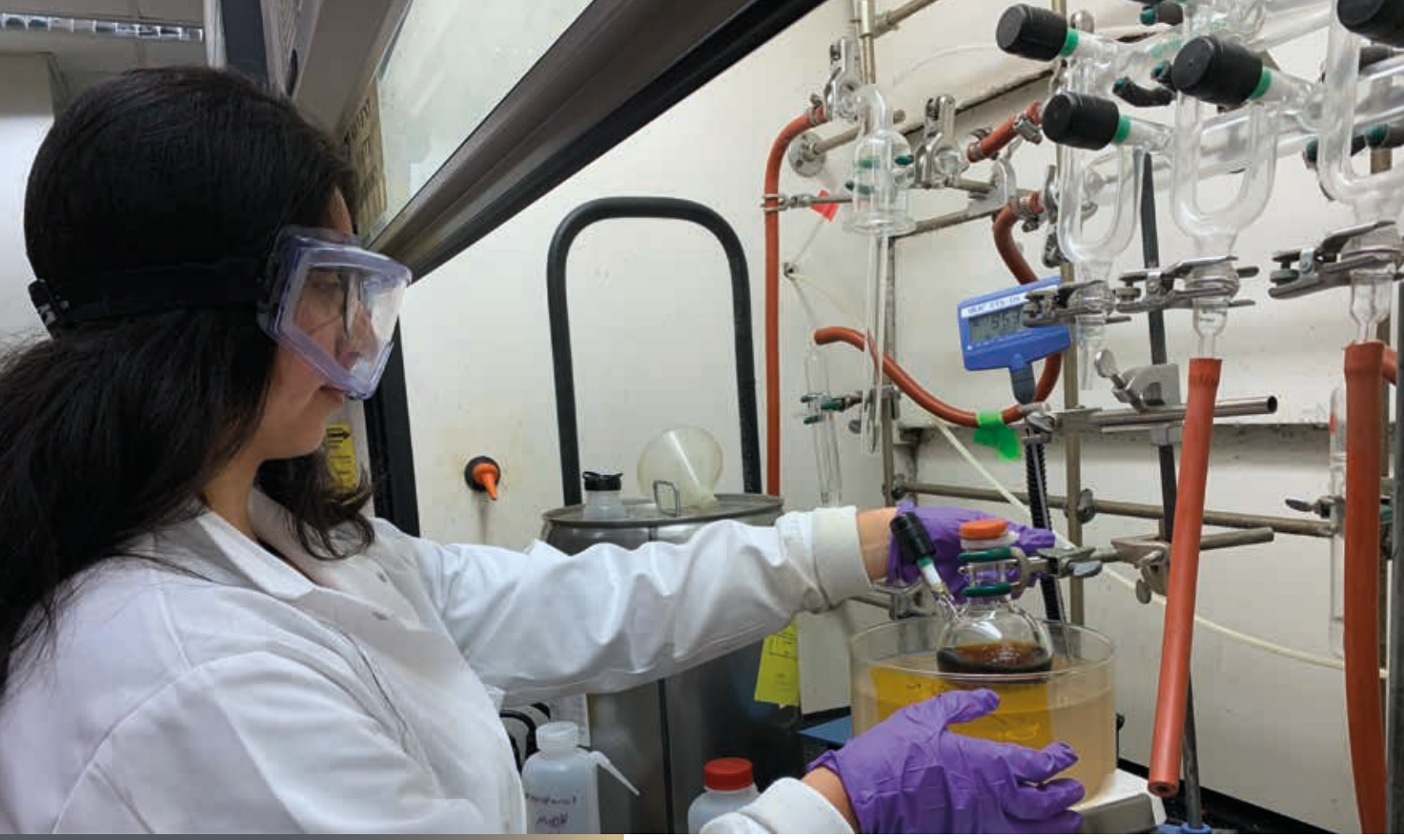
Margaret Gitau (Purdue Advisor)

Carlos Eduardo Cubillos (UN Advisor)

Evaluation of Sampling Frequencies to improve Water Quality Sampling in the Andean Region

I have been working during my research experience with the Water Resources and Ecohydrological Engineering group led by Dr. Gitau. The project aims to estimate the optimal water quality sampling frequency through the comparison of different proposed methodologies, and the evaluation of biological variables that can affect the water quality. The evaluation conducted seeks to make recommendations of optimal sampling frequency for further implementation in the Colombian Andean region, in order to improve the water management policies and support the decision making. To reach this goal, I work actively conducting the literature review of methods implemented to estimate the optimal sampling frequency, and its relationship with ecological thresholds and the water quality sampling goals. To evaluate the methods and the Sampling frequencies proposed, I have performed a statistical analysis and the data processing of water quality monitoring datasets for different scenarios.

This experience has led me to learn more about database management, QA/QC assessment, as well as developing my programming tools and data processing skills. Also, I have had the chance to learn by first hand about water resources, water quality and sustainability, which passionate me. This learning experience not only has enriched my life as a researcher, but also my life as an engineer, as a foreign student and as a woman. Now, thanks to my experience at Purdue, I'm convinced I want to keep researching and learning.



COLLEGE OF ENGINEERING

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Chemical engineering

Bryan W. Boudouris (Purdue Advisor)

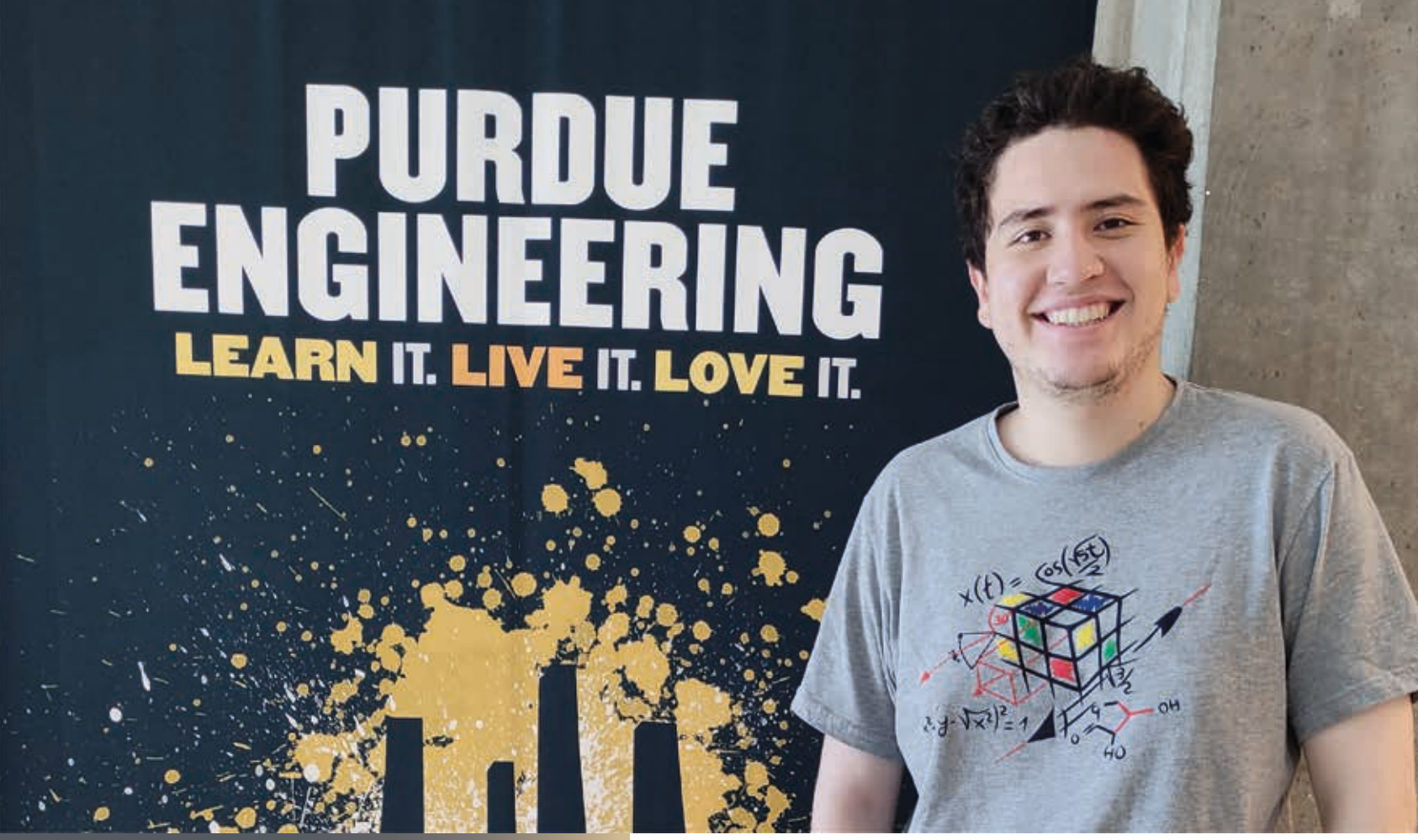
Letian Dou (Purdue Advisor)

Ruth Janeth Lancheros (UN Advisor)

Synthesis and characterization of organic radical – halide perovskite hybrid semiconductor materials

During this internship at Purdue in the UREP – C program, I worked for the Boudouris and Dou research groups at the Davidson School of Chemical Engineering on synthesis and characterization of organic radical – halide perovskite hybrid semiconductor materials. The Two – dimensional (2D) organic – inorganic hybrid halide perovskites have unique properties as long lifetimes, high photoluminescence efficiencies, and toleration to defects. In the recent decades, this field has been a great progress, developing not only the synthesis of the organic layers, 2D dimensional hybrid halide perovskites, but also development in semiconductor materials and different application devices for approaching their electronic properties. However, incorporating different organic layers and improving the chemical and electronic properties have been challenging. Organic-inorganic hybrid 2D halide perovskites represent a new class of materials that alternate chemically and electronically at the molecular level. These materials provide new possibilities in the future materials design, finding the possibilities to combine desirable properties (physical, chemical, etc.) in organic and inorganic components.

I am very grateful for the opportunity that the national university and Purdue university gave me to develop my skills as a researcher. In this research experience I was able to grow and challenge my boundaries and goals, not only in the academic life, but also in my personal level.



COLLEGE OF ENGINEERING

Ivan Arturo Nuñez Ferro

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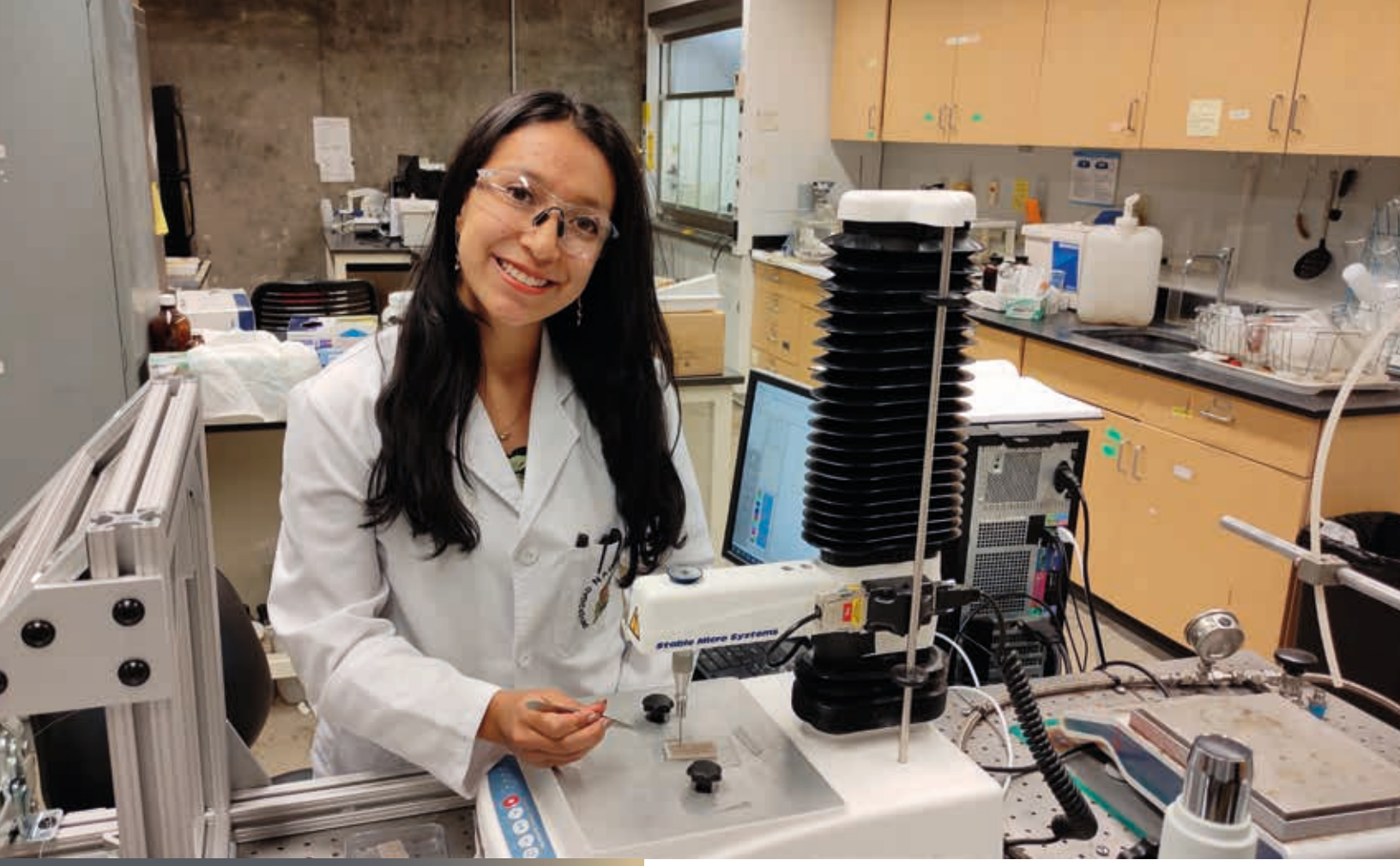
Electrical engineering

Luciano Castillo (Purdue Advisor)
Camilo Andres Cortes Guerrero (UN Advisor)

Renewable Energy Sources Forecasting with Atmospheric Variables for Smart Microgrid Stability

Hello there, my name is Ivan Arturo Nuñez Ferro and during my stay at Purdue I worked with Dr. Luciano Castillo in the Mechanical Engineering department trying to develop a sustainable microgrid in order to create several clean energy and water corridors initially along the border of the United States of America, and then try to apply the same logic to the conflict in the Colombian-Venezuelan border, in order to alter positively the zone, creating prosperity, work security and clean energy and water to migrants and residents as well. Using my Electrical and Electronic Engineering knowledge we are trying to develop more compact and easier to deploy microgrids in the cases mentioned before, or even in the event of a natural disaster. This whole experience has been very educational, not only for my engineering background but also for myself, I have learned how to do proper research and the equipment necessary to do so, and also I enrichened myself as a person and how can I properly do my work and help people in the way



COLLEGE OF ENGINEERING

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Chemical engineering

Chelsea Davis (Purdue Advisor)

Nestor Algecira Enciso (UN Advisor)

Understanding the Fundamental Mechanics of an Elastomeric Matrix

During my research stay within the UREP-C program, I worked for the Davis Research group at the School of Materials Engineering in understanding the fundamental mechanics of the elastomeric matrix of Polydimethylsiloxane (PDMS). The main objective of my research was to study how the polymer matrix is affected by embedding different kinds of particles into it, taking into account the volume fraction of the particles and the particle size distribution. To reach the objective I prepare samples of different comercial PDMS from Dow Inc and Smooth-on, with added particles of regular and lab sand. To determine the effect on system properties like the Young's Modulus I performed tension and compression tests with the Texture Analyzer and to characterize the shape and size of the particles I used the Epifluorescence Microscope to then relate that with the results of the mechanical test. This has been an enriching experience for my professional career because through my research I have learned techniques to characterize the mechanical properties of elastomeric matrices and also the basic concept of soft materials.

In addition to my academic experience, I have had the opportunity to grow on a personal level because of the great cultural diversity found at Purdue.

COLLEGE OF ENGINEERING

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Yris Olaya Morales (UN Advisor)

Real-time non-intrusive workload monitoring-Integration of human factors in surgery

The operating room is a complex environment in which surgeons can experience high levels of workload that lead to poor outcomes, e.g. patient injuries or sentinel events. In the real-time project, we conducted experiments to find solutions that can improve surgeon performance and reduce the level of cognitive load using the Da Vinci Research Kit, a robot composed of two subsystems: the surgeon's console, which teleoperates the robot, and the patient-side room, where the robot arms are manipulated from the other side. We also use sensors such as EEG (Electroencephalogram) and Eye - Tracker to measure physiological signals in order to obtain results that provide certain information to the surgeons when they experience high load.

On the other hand, I am grateful to my advisor for giving me the opportunity to work with my mentors Juan and Jing in the *dvrk* lab. I must admit that it was a challenge to learn about topics that I did not master and at the same time the alternatives that industrial engineering at Purdue offers to grow as a professional and as a human being.

Finally, infinite thanks to God, my family, my friends and the National University for their teachings and support. I hope to be able to help future Colombians in the same way that this opportunity presented itself to me.

COLLEGE OF ENGINEERING

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Chemical engineering

Vilas Pol (Purdue Advisor)

Carlos Sanchez Sanz (UN Advisor)

Study and Manufacture of Sodium Batteries Components

During my stay at Purdue, I worked for the Vilas Pol Energy Research group at the Davidson School of Chemical Engineering working with Lithium and Sodium rechargeable batteries, mainly the second one. Batteries are an energy source used in portable devices and now, it is an alternative for combustion engines with a fuel tank, as it has been seen in electrical vehicles. So far, the most common battery is the Li-ion because it has become an excellent, powerful, and sophisticated energy device, however, there are some critical characteristics such as its toxicity and little abundance in the earth that makes it necessary to look for other alternatives. Is for that reason, that I am studying sodium batteries, due to it is a less expensive material, more safety, and have similar properties. We are synthesizing electrodes with Sodium, a Transition metal, a Metal and Oxygen in different temperatures and ratios to obtain a P3 structure, finally trying to find the best pieces that working together, deliver good electric energy. I have liked my experience overall, mostly in the academic field with all the techniques and knowledge I have learned here, but on the other hand, I have loved the cultural exchange, being this internship the opportunity to know more about research and science but also, to know more about many people from all the world.

COLLEGE OF ENGINEERING

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Geological engineering

Venkatesh Merwade (Purdue Advisor)

Albeiro Rendón Rivera (UN Advisor)

Flood Mapping Using Satellite Images and GIS Tools: A case study of Indiana, USA

The knowledge from my advisors and the research development carried out on the subjects, interest me to train professionally. I have found myself with all the disposition to learn, propose and contribute. This opportunity that Purdue University and Universidad Nacional de Colombia have given me to gain knowledge with researchers and exchange technical and cultural knowledge with other colleagues, is an opportunity of great impact for me. I have been working on determining the floodable area in the state of Indiana-USA, using two mapping methods, to better understand the hazard of flooding in the study area. Because knowing the hazard (In this case, flooding) allows us to make decisions in meeting mission requirements related to flood hazard mitigation, planning, and response. Moreover, according to the National Weather Service (NWS) of the United States, floods are typical in Indiana which is in the U.S Midwest, the center of agriculture and biofuel production.

COLLEGE OF SCIENCE

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physics

Rafael Lang (Purdue Advisor)

Leonardo Castañeda Colorado (UN Advisor)

Protochime: The first steps towards a direct gravitational dark matter detector

During my stay at Purdue, I worked in the Experimental Dark Matter group led by professor R. Lang. During these 6 months, I've been creating a prototype for the first direct dark matter detector based on purely gravitational effects. It has been a life changing experience not only academically but also personally. I learned to engage in productive and efficient ways with a top-notch research group, and settled on a strong basis to continue my career as a scientist in a graduate program.

COLLEGE OF SCIENCE

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Geology

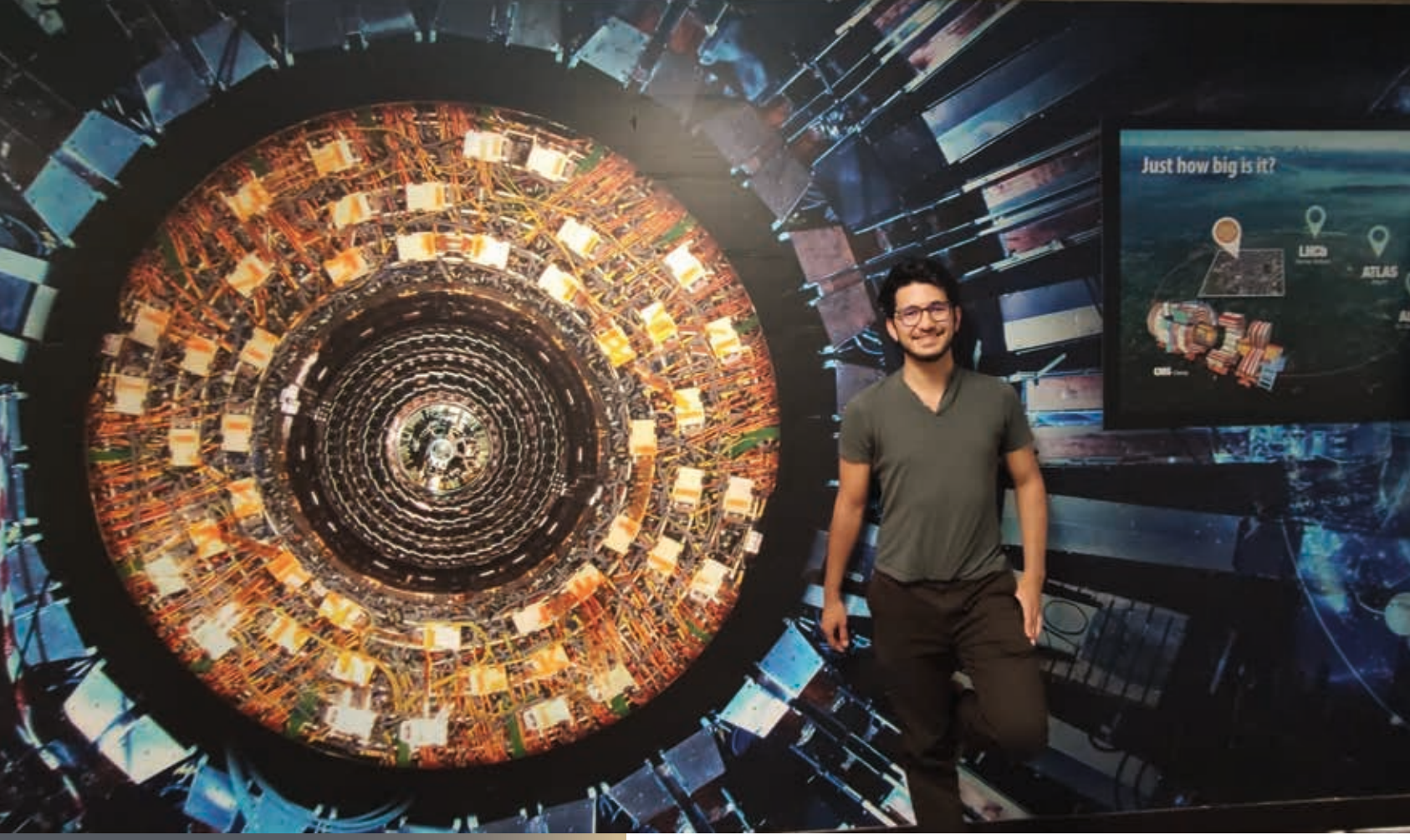
Marty D Frisbee (Purdue Advisor)

Luis Hernan Ochoa Gutierrez (UN Advisor)

"I look forward to contributing to the field of groundwaters in Colombia."

Geochemical modeling of glaciated mountain aquifers in Mount Hood, Oregon and Glacier National Park, Montana

Throughout my research stay at Purdue University, I worked with the Groundwater/ Surface Water Interactions Group of Dr. Marty Frisbee. My research was about understanding better the groundwaters of the glacial systems of Mount Hood, Oregon and Glacier National Park, Montana, through the geochemical modeling of spring waters and using tools as Piper and Stiff diagrams, geothermometers, isotope data, two end member simple mixing models, and inverse modeling. While I was doing my major in Geology at Universidad Nacional de Colombia, I found hydrogeology very interesting and practical for society. Although I had already worked in this area, this research was a challenge for me due to its complexity. Fortunately, I had counted on the valuable support and guidance of Professor Dr. Marty Frisbee and Jordyn Miller to complete this project. The UREP-C program has been a great experience that allows me to get out of my comfort zone and growth personally and academically. It also allows me to dream bigger and to appreciate the most important things of life. For now, I will finish my undergraduate degree and keep planning the next steps, which include continuing my education as a graduate student in the field of groundwater.



COLLEGE OF SCIENCE

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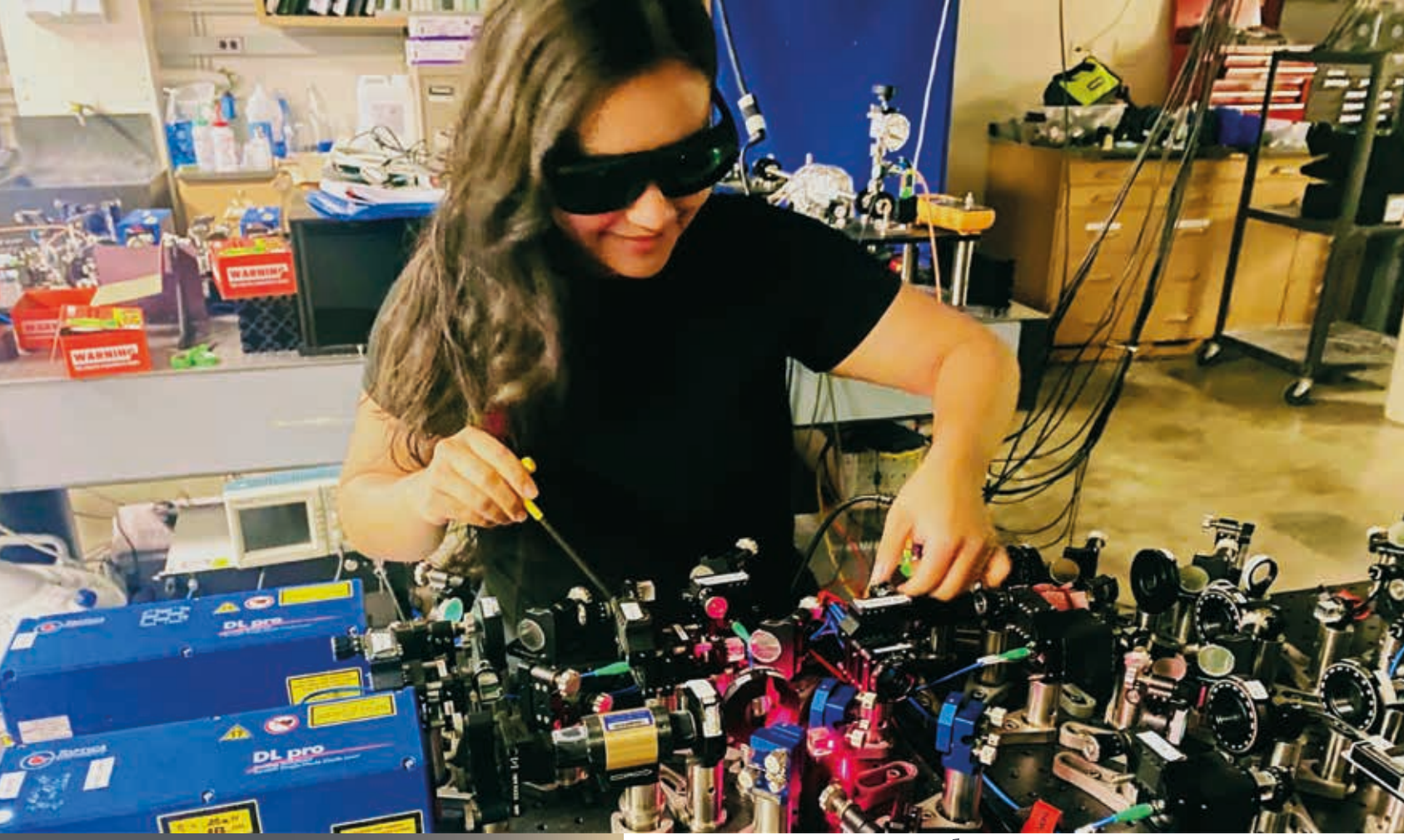
Physics

Fuqiang Wang (Purdue Advisor)

Diego Alejandro Milanes Carreño (UN Advisor)

Analysis of p + p collision simulation at ECM = 200 GeV

During my time at Purdue, I worked for the High Energy Nuclear Physics group with Professor Wang. My research was based on generating proton + proton collision data with an eCM = 200 GeV and then analyzing phenomena (Chiral MAgnetic Effect) that contribute to models beyond the current standard model. The UREP-C program has been the best experience of my life both academically and personally, it has made me grow in many aspects and has given me a clearer guide of what I want to do in the future. It has also taught me what research is like, the dedication and passion it takes to be a researcher. In addition, it has left me with many friends who I can count on and who I know will become excellent researchers in the future.



COLLEGE OF SCIENCE

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Physics

Jonathan Hood (Purdue Advisor)

Leonardo Castañeda (UN Advisor)

Assembling Ultracold Molecules

During my research stay I have been fortunate to work in the Hood Lab (Purdue Ultracold Molecule Lab). The goal of the group is to trap single ultracold molecules in optical tweezers with complete control of their internal and motional quantum states. The long-lived ground rotational states of ultracold molecules are exciting new candidates for qubits in quantum computation or in quantum simulations. That is why ultracold dipolar molecules offer a number of exciting new prospects for quantum technologies and for studying and controlling quantum chemistry.

In this group I have gone through quantum and atom optics physics theory. I have learned to work with optics tables, lasers, electronics, spectroscopy techniques, and the main objective of my research has been to understand, design and implement the Raman sideband cooling technique in order to obtain cesium ultracold atoms that have previously been trapped with optical tweezers in a magneto-optical trap.

This experience has undoubtedly been one of the best of my life. It has opened the doors to top research for me, it has allowed me to work with laboratory equipment that I never thought was within my reach, to visit places that I had never imagined, and share with invaluable people.

Thank you UN and Purdue for making this possible. I look forward to giving back some of all the good that this has brought us in the future.

COLLEGE OF SCIENCE

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Statistics

Hao Zhang (Purdue Advisor)

Ruben Guevara (UN Advisor)

A Study of Precipitation Patterns through Stochastic Ordering

During my research experience at Purdue University, I had the fortune to work with professor Hao Zhang. His research is mainly focused on Asymptotics theory, Environmetrics, and spatial statistics. During this process, I worked in the Environmetrics and spatial statistics branch in which I used the concept of stochastic ordering to study Environmental variables such as temperature and precipitation. I carried out all the data recollection from the NOAA (National Centers for Environmental Information), cleaning and filtering all the data. Finally, under the supervision of professor Zhang, I analyzed this data over time, using the nonparametric EI Barmi–McKeague test and summarized all the information using map plots of the target variables. These research experiences have left me valuable knowledge in this field, and also a development on programming skills and analyzing a big amount of data.

COLLEGE OF SCIENCE

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Mathematics

Manuel Rivera (Purdue Advisor)
Lorenzo Acosta (UN Advisor)

Monotone path polytopes and combinatorial models for free loop spaces

During my research stay at Purdue, thanks to UREP-C, I had the great opportunity to work with Professor Manuel Rivera at the Department of Mathematics in a problem situated in the intersection of four major branches of mathematics: Algebraic Topology, Combinatorics, Category Theory and Geometry. The main objective of my project was to understand how simplices and cubical spaces could be used as models for free loop spaces and based loop spaces, and then to further extend these constructions to introduce new combinatorial objects. Although initially this was a problem on Algebraic Topology, later we realised that we could reformulate it in terms of Geometry. This was a deeply enriching mathematical experience, as on one hand I had to learn many new topics and methods along the way and, on the other hand, I had to learn to conduct research. Besides that, throughout these 6 months I have lived many meaningful and beautiful experiences that have made me grow and that have allowed me to know new cultures and people.

COLLEGE OF LIBERAL ARTS

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Philosophy

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Fairness in Artificial Intelligence

Artificial Intelligence-Fairness is a research field looking for better practices inside Artificial Intelligence algorithms. These practices could involve avoiding discrimination and biases that lead to inequality to historically unprivileged groups. In the current research, the concept of Fairness is approached from a medical-atmosphere point of view, specifically, nurses' perspective. The main aim is to know how historical ideas and knowledge around stakeholders affect the Fairness in the algorithms currently in use. A general objective is to achieve a common conception of 'Fairness' considering interested parties involved in the US HealthCare System.

This Research Experience has been a source of knowledge and enrichment that has allowed me to contribute to society while I enjoy what I do. For that, I really appreciate the support of Professor Christopher Yeomans, Professor Raúl Meléndez, and my Purdue research group, who have given me the possibility of learning and growing with them. I cannot be more grateful to Purdue University and my forthcoming alma mater, Universidad Nacional de Colombia.

COLLEGE OF HEALTH AND HUMAN SCIENCES

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Nursing

Natalia Rodriguez (Purdue Advisor)

Lorena Chaparro (UN Advisor)

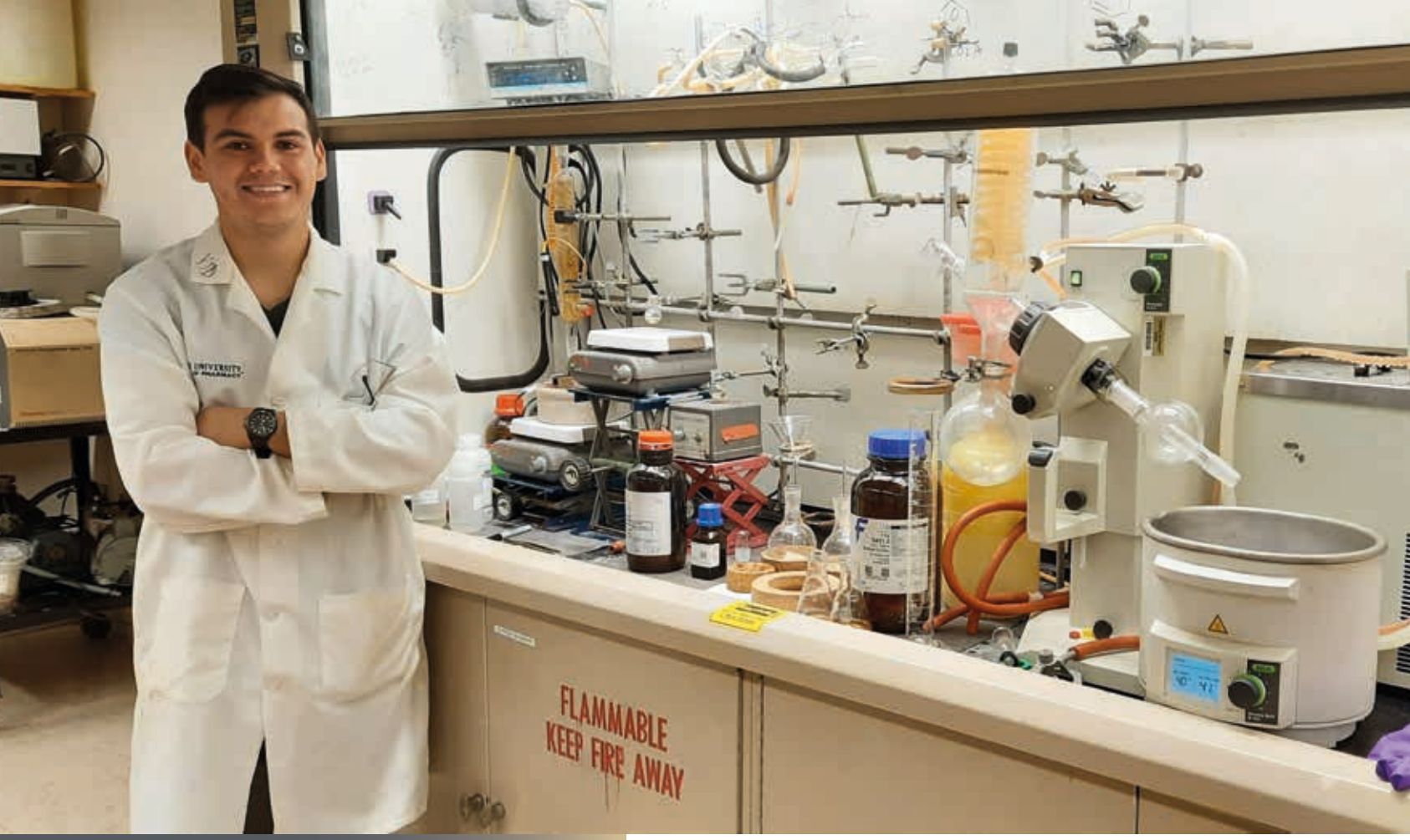
Addressing multi level barriers to cervical cancer screening among Hispanic communities in Indiana

During my research stay I have been fortunate to work in Rodriguez's lab. The goals of the project are to 1) understand multilevel barriers to cervical cancer screening, including provider and patient knowledge, attitudes, and practices around current cervical cancer screening methods. 2) gauge acceptability of alternative screening strategies including patient self-sampling, rapid HPV testing, and CHW-led patient navigation, and the factors associated with adoption of such innovations.

In this group I have gone through qualitative data analysis and alternative cervical cancer screening methods. I have also learned to work as a research team member, making evidence based decisions on how to pose quantitative and qualitative techniques to gather data from patients.

This experience has been significant for me. It has helped not only for my professional but also my personal development. I have been able to meet a lot of amazing people and been to some interesting places.

Thank you UN and Purdue for making this possible. I look forward to using this knowledge in Colombia to strengthen the current partnership between both universities.



COLLEGE OF PHARMACY

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Pharmacy

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Norma Angélica Valencia Islas (UN Advisor)

Metabolism optimization of novel anti-filoviral vacuolar (H+)-ATPase inhibitors through selective deuteration

During my research experience at Purdue University, I joined the Medicinal Chemistry and Molecular Pharmacology department in the College of Pharmacy. I worked for the Davisson research group in a project for the discovery and development of new antiviral drugs for the treatment of Ebolavirus disease (EVD) and related diseases. Ebolavirus is a highly contagious virus that can cause severe hemorrhagic fever in humans. During the outbreak in west Africa in 2014 there were 28000 confirmed cases and more than 11000 deaths. With the objective of preventing future outbreaks, it is necessary to develop novel treatments. Diphyllin derivatives have shown high activity against Ebolavirus through Vacuolar (H+)-ATPase inhibition, showing also low toxicity. However, their chemical structure presents metabolic liabilities that can prevent them from being a potential drug candidate. Therefore, the objective was to develop a novel chemical scaffold with improved metabolic stability, using selective deuterium substitutions. I focused on the synthesis, and characterization of the deuterated precursors and Diphyllin derivatives together with a computational study to predict the metabolism of the deuterated derivatives compared to Diphyllin.

Apart from the academic progress, it was a gratifying experience in all aspects. I opened my mind and experienced what research really meant to me, passed hard times having to show resilience and perseverance, and overcame my limits doing things that I did not believe I was able to do.

COLLEGE OF PHARMACY

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Chemistry

Daniel Flaherty (Purdue advisor)

Zuly Jenny Rivera (UN advisor)

Design and synthesis of carbonic anhydrase inhibitors with potential antibacterial activity

My research experience at Purdue University was developed with the mentoring of professor Daniel Flaherty from the Medicinal Chemistry and Molecular Pharmacology Department.

Regarding the project, this is about the optimization of chemical compounds effective for fighting infections caused by Vancomycin Resistant Enterococcus (VRE) bacteria. The aim is to obtain one or some promising chemical compounds that can be potentially led through clinical trials and converting into FDA approved drugs. Clearly, that is a long-term goal but for me sounds great and it's one of the things I would want to work on in my life, looking for new drugs useful to improve the life quality of people who suffer from such hard diseases. Specifically, the project is based on the idea of "repurposing drugs", which has become attractive in the field of drug discovery. We start from AZM, which is an FDA approved drug for treatment of glaucoma and was proved to be active against VRE. Next, computational tools are used to optimize and look for chemical modifications that can improve the activity of AZM. Based on this information, new substances are synthesized and then used in several assays to prove their activity against bacteria. At the end, it's expected to obtain a very active AZM analog which, due to the fact of being similar to an FDA approved drug, can overcome the steps towards being officially accepted as a drug.

I am really grateful for this opportunity since I could learn a lot and enjoy the University. I am sure this was a good step for my starting professional career.

COLLEGE OF AGRICULTURE

Sol Carolina Parra Santos

scparras@unal.edu.co

Biology

Douglas Scott Richmond (Purdue advisor)

Fernando Fernandez Castiblanco (UN advisor)

Effect of japanese beetle (popillia japonica) infestation on soil carbon and nitrogen cycling

At the Soil insect ecology lab at Purdue Entomology department, I worked with Dr. Richmond with geochemistry of soil infested with white grubs. Most of the work was done on Japanese beetles (*Popillia japonica*) in grasslands, but I support projects with Asiatic Garden beetles (*Maladera castanea*) in mint fields as well. I carried out field experiments and laboratory methodologies to measure the nitrogen and carbon losses of a mesocosm infested with Japanese beetles. The techniques that I learn and experience I gain in the field lend me to have a new perspective of what is applied entomology. My previous experiences have focused on taxonomy and biodiversity of insects, entomology applied to agriculture is not just a new but a very interesting field of entomology that helps to solve problems for farmers. In addition to the academic experience, I have been involved in social and cultural spaces that have enriched me by being an opportunity to interact with people from different countries.

PURDUE POLYTHECNIC INSTITUTE

Juan Camilo Rodríguez Puentes

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Computer engineering

Bedrich Benes (Purdue Advisor)

Elizabeth León Guzmán (UN Advisor)

"Never stop smiling, because you don't know who can fall in love with your smile."

3D OpenGL Simulation - Electron Field Mapping

During this internship I worked in designing and developing an application that assists in the understanding of the concepts of vectors and vector fields in a more simplified way for the Costa Rican youth community and also for general users. To introduce my project, I will tell you a bit about its motivation, and additionally, with this, I will be able to share a bit of my experience as a computer engineering student.

Approaching the middle of my studies within the program, I participated in vector calculus coursework and understandably, as other students, I found this course to be particularly challenging. Due to the nature of my learning styles, a naturally more hands on way of learning, and I have noted that this subject is not something that always comes easily to me. And this, unfortunately, led to my failure of the course the first two times taking it. I found difficulty in truly comprehending and internalizing various concepts about vectors and vector fields, what they were for and what was its fundamental purpose.

Regardless, I persisted. Its persistence to which I finally overcame such obstacles. It's with this that I wish with much fervor that others do not experience the same struggles that I had to endure to understand these concepts. Quite gratefully, this research experience has provided me with this opportunity of developing an application meaningful in many ways for other people and also for me. Respecting this project, I take confidence in saying that I feel extremely blessed to this university and specifically to my advisor for encouraging me to develop this project and I sincerely hope that the information presented serves communities in the near future. And I am excited to say that the content fits perfectly with my intention of developing a teaching tool that helps prevent that anyone feels the way I did learning these materials. I merely conform in knowing that my work is helping others.

Finally, this internship has not only contributed to my academic life in new fields of knowledge, but also has served my personal development. I am truly grateful for all the friends, memories and adventures that the UREP-C program has provided me.

KRANNERT SCHOOL OF MANAGEMENT

Ana Gabriela Ramirez Lopez

agramirezl@unal.edu.co

Administrative engineering

William Ben McCartney (Purdue Advisor)

Sergio Botero Botero (UN Advisor)

An overview of immigrant vs. U.S.-born household wealth

During this internship I worked in understanding whether the dynamics of U.S. and immigrant households represent variation in terms of wealth. We address this objective by using the Panel Study of Income Dynamics (PSID) data from years 2013, 2015, 2017 and 2019 on the wealth of immigrant and non-immigrant households in the U.S. The outcomes would allow us to understand the unique constraints and circumstances that drive the financial behavior of immigrants. This research would be a first step in adapting traditional financial products to help households achieve their outcomes more efficiently. Finding out how the dynamics of immigrant and non-immigrant households in the U.S. differ, could provide insights into the impact of various economic policies on household financial outcomes.

Additionally, I have also been able to work hand in hand not only with my advisor but also with other faculty members in research projects led by them. Also, I have participated in seminars with researchers from other universities where research projects at high maturity stages are presented. Beyond the seminars, I have been able to have personal meetings with people in academia and even in industry. With this internship, I have learned more about what it means to be a researcher. And, also, this internship has not only contributed to my academic life but also to my personal development. I am really grateful for all the friends and memories that UREP-C has given me.

COLOMBIA PURDUE PARNERTSHIP*

Alejandra Armesto Gómez

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Business management

Arvind Raman (Purdue Advisor)

Juanita Villaveces Niño (UN Advisor)

Inter-institucional science diplomacy relationships: case of study between Purdue University and some Colombian institutions

During the research stay I was studying the diplomatic science relations that are built between Purdue University and some Colombian institutions and their contribution to the economic development of the country. Specifically, we analyzed the economic impact of the UREP-C and APOLO I programs in Colombia, under the theoretical framework proposed by the American Association for the Advancement of Science.

In the development of this research I developed very valuable skills such as information synthesis, soft skills to work with people from other entities, writing and reading in English, data processing, among others.

From my perspective, this has been one of the most enriching experiences I have had in my academic and personal life. I am deeply grateful to the Universidad Nacional de Colombia and Purdue University for giving me this opportunity.

**Program for Colombian students interested in visiting Purdue University.*

COLOMBIA PURDUE PARNERTSHIP*

Maria Camila Ulloa Gómez

mculloag@unal.edu.co

Business Management and Public Accounting

Juan Diego Velázquez de Bedout (Purdue Advisor)

Martha Isabel Riaño Casallas (UN Advisor)

UREP-C: A documentary and implementation review

Having the UREP-C program as an object of research has allowed me to appreciate and confirm its benefits. Throughout this experience I have been able to dimension the different aspects that must be considered to materialize an idea.

My work has been based on a contextual, theoretical, and methodological presentation of the program execution process. To make a proposal for a program evaluation guide, the rationale and the concept of Research Programs for Undergraduate Students have been considered.

Due to the importance of having a harmony and adaptation of the plan with the results of the program, it is necessary to start from the role of the parties involved to make a contrast of the expected results with those obtained.

As a student participant of the program, I have had the opportunity to see more in depth how this program promotes the integral formation of the students at a professional and personal level. Which also interferes in the development of global learning and intercultural awareness.

The research conducted highlights the existing mutual benefit that is generated by establishing links between the institutions. Therefore, by evaluating the different points of view, it is possible to confirm how the international vision, when maintained over time, has an impact on scientific production and on professors' and students' capital.

I should express my gratitude for the confidence that Juan Diego Velázquez had in me by allowing me to work on this project. Thanks to him and the support of Nancy Rozo and Antonio Fruccio, from the International Relations Office of the Bogota Campus, the research has made great progress. Particularly, I have learned to value their task of promoting and carrying out the formal opening of international cooperation scenarios.

**Program for Colombian students interested in visiting Purdue University.*

ACKNOWLEDGEMENTS

PURDUE UNIVERSITY

Being part of this experience in another country has been a big challenge in which Purdue has allowed us to open our minds by doing research, a huge step for all of us. In the past few months, we practiced all knowledge acquired across years of study in the Universidad Nacional de Colombia, we also learnt about the different cultures that Purdue has seen grow over the years, and we met people with whom we shared significant memories and adventures.

On the other hand, all of us had the opportunity to grow as humans. We know we are not perfect and learning from mistakes and showing a little empathy in our society is what makes us better human beings. There is a long way to go and reach our goals. This was the first step for some of us to follow our dreams as researchers. We want to say thank you to Purdue University because it has opened the doors to access knowledge across spaces as laboratories, libraries, study centers and people.

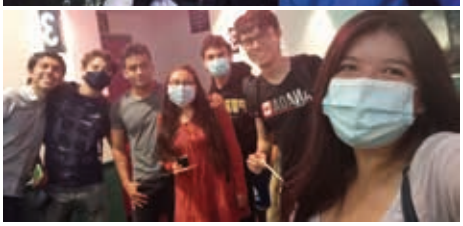
ACKNOWLEDGEMENTS

UNIVERSIDAD NACIONAL DE COLOMBIA

Universidad Nacional de Colombia (UN) has been our home for the last few years. We have been living rewarding experiences since the first day in and out of the campus. there and growing up in all the senses. All of us have been studying and preparing there for the future and to give our best to the society through our careers, we have given our better part to the UN and it to us, too. Now, we want to say thank you to the UN for allowing us to do this magnificent exchange at Purdue University. Without its support and trust we would not have been able to be here as we did. We started the way to learn at UN, and now we have finished it as a research experience, which is going to open the doors to the academic world that will come to our future. It is just the beginning, and we are not going to stop and learn and grow up as people and professionals. We are going to continue working to make our family, society and our university proud of us.

Human quality in UN is amazing, professors and students that supported all of us enriched our experience. We are grateful because UN trusted in each one's capabilities and gave us the opportunity to increase as researchers and as a person; the link between us and the United States is going to be a rewarding experience in our lives. Finally, we thank UN for allowing us to be part of this program even during the hardest time that society has experienced in this last year. Way is still long to achieve our goals, but this has been a great experience for us.

OUR EXPERIENCE

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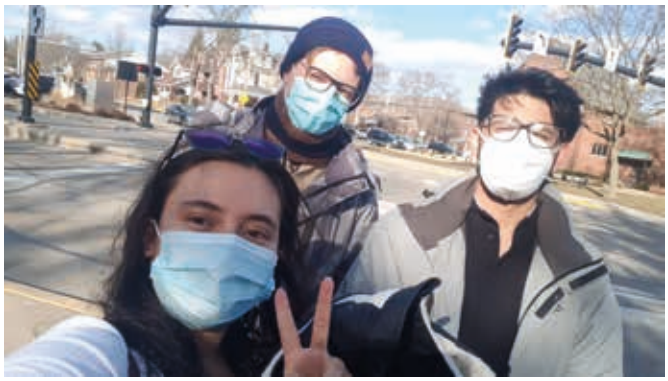


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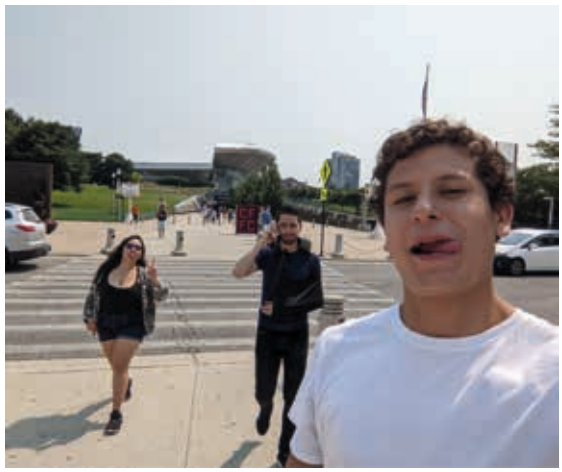

OUR EXPERIENCE


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PURDUE
PURDUE

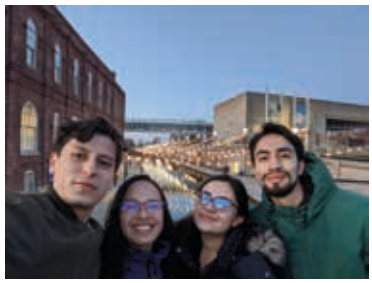

MEDIUM


Congratulations
team Los Amigos for
placing first at trivia
night!!

OUR EXPERIENCE









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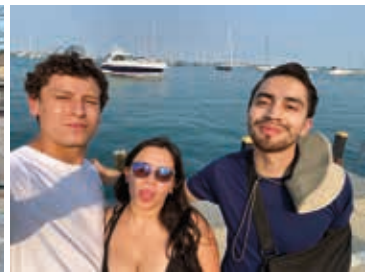


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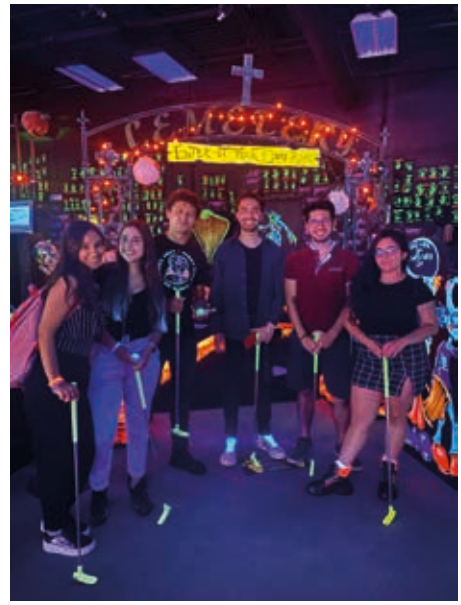
OUR EXPERIENCE


Hard Rock
CASINO



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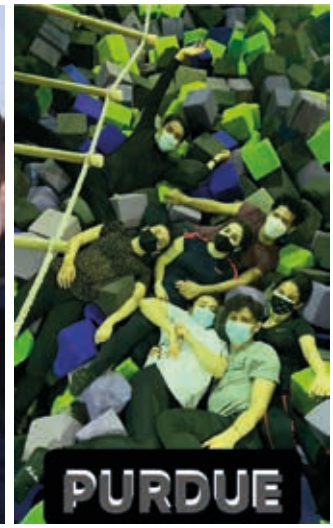
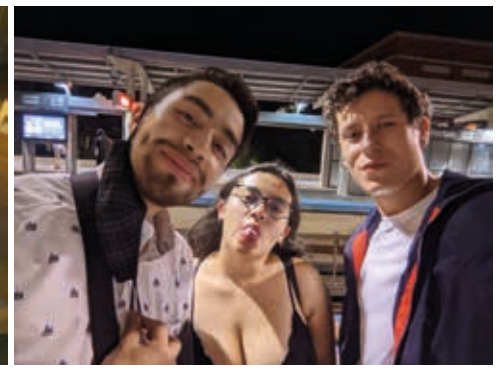
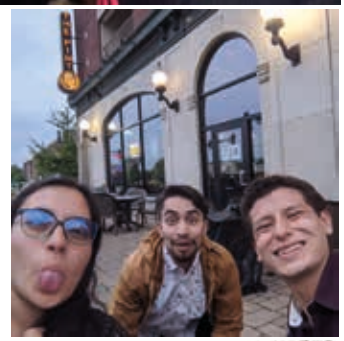
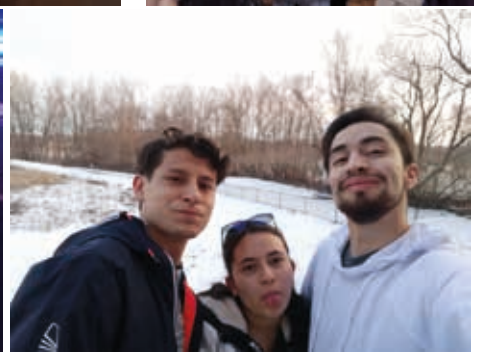


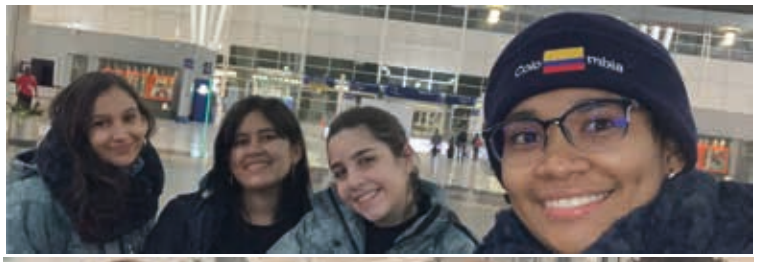
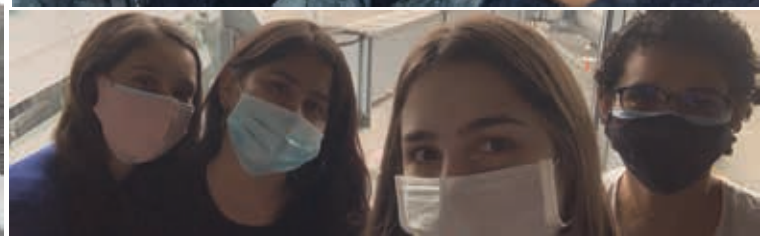






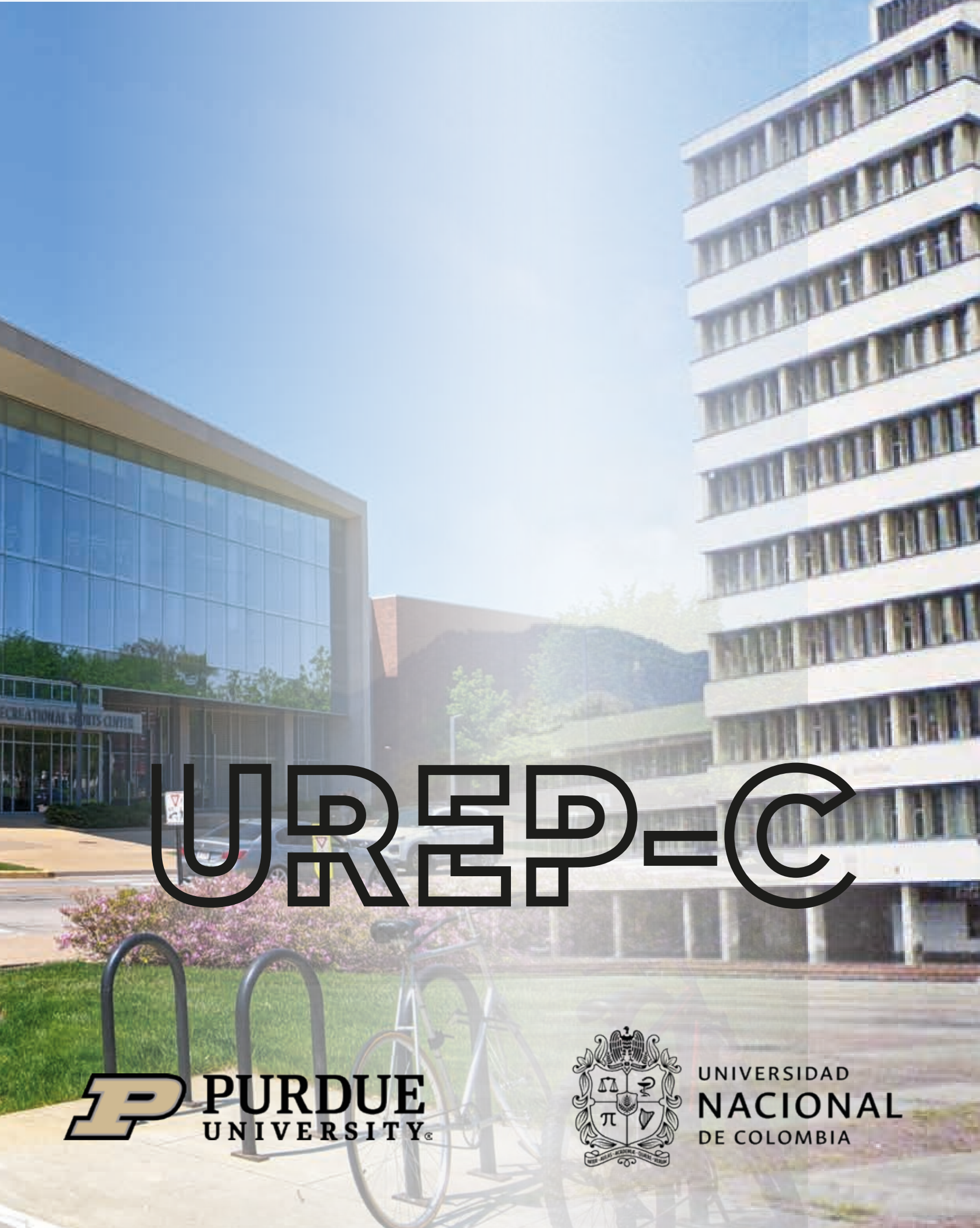


OUR EXPERIENCE

Created by Roy Daniel Herrera Almeida



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