

*Universidad de Puerto Rico Recinto
Universitario de Mayagüez
Departamento de Física*



Informe Anual 2020 – 2021

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Tabla de Contenido

Información general del Decanato y Unidades Adscritas

- A. Misión y Visión
- B. Descripción y funciones
- C. Estructura de la unidad
- D. Perfil del Decanato

Informe de iniciativas, actividades y logros de acuerdo al Plan Estratégico

- A. Resumen Ejecutivo
- B. Misión
- C. Institucionalizar una cultura de Planificación Estratégica y Avalúo
- D. Estar a la vanguardia de la educación superior en Puerto Rico garantizando que nuestros alumnos reciben la mejor educación
- E. Aumentar y Diversificar las Fuentes de Ingreso de la Institución
- F. Implementar Procesos Administrativos Ágiles y Eficientes
- G. Fortalecer la Investigación y Labor Creativa Competitiva
- H. Impactar a Nuestra Sociedad Puertorriqueña
- I. Fortalecer el Sentido de Pertenencia y “Orgullo Colegial”

Información General del Decanato y Unidades Adscritas

A. Misión y Visión

- a. Misión y Visión del Decanato o CID*
- b. Misión y Visión de unidades adscritas al Decanato, CID o Rectoría*

B. Descripción y Funciones

- a. Descripción y Funciones del Decanato o CID*
- b. Descripción y Funciones de las unidades adscritas al Decanato, CID o Rectoría*

C. Estructura Organizacional

Personal No Docente (5) y Docente (22)

- a. Organigrama del Decanato o CID*
- b. Organigramas de las unidades adscritas al Decanato, CID o Rectoría*

D. Perfil del Decanato y Departamentos

- a. Programas académicos*
- b. Matrícula subgraduada y graduada por programa académico*
- c. Grados otorgados por programa académico*
- d. Personal docente y no docente*

Informe de iniciativas, actividades y logros de acuerdo al Plan Estratégico

A. Resumen Ejecutivo

La **misión del Departamento de Física** emana de la triple misión de la Universidad de Puerto Rico:

- *Enseñar:* Educar a nuestros estudiantes para ayudarles a entender y explorar los fenómenos físicos, aplicar pensamiento crítico al plantear, analizar y resolver problemas, mantener un alto grado de integridad profesional en la práctica de sus carreras.
- *Investigación:* Sostener y adelantar el conocimiento de la física y campos afines y la investigación de fenómenos físicos.
- *Servicio:* Promover la física y campos afines como disciplinas en la universidad, las escuelas y la comunidad en general.

Acompañado de la misión del Departamento de Física están las **Metas y Objetivos del Departamento de Física:**

- 1) Proporcionar enseñanza efectiva de la física y disciplinas afines.
- 2) Realizar y adelantar la investigación en física y disciplinas afines.
- 3) Preparar a nuestros estudiantes para competir en el mercado de empleos.
- 4) Diseminar y promover el conocimiento científico.
- 5) Proveer en general y a la comunidad en general servicios congruentes con los recursos humanos y las instalaciones físicas del departamento.
- 6) Estimular el desarrollo de actividades interdisciplinarias entre la física o campos afines y otras ramas del saber.
- 7) Estimular y facilitar el desarrollo profesional de los miembros del departamento.
- 8) Promover interacciones de la facultad y estudiantes del Departamento con la industria, agencias gubernamentales, laboratorios nacionales y otras instituciones académicas o de investigación.

Durante el año académico 2020-2021 el Departamento de Física se mantuvo fiel a su Plan Estratégico, alineado a su vez con el Plan Estratégico de la Facultad de Artes y Ciencias 2012-2022.

A continuación, verán un relato de como el Departamento de Física dedicó esfuerzos en mejorar la enseñanza de la física de una manera remota.

En el área de investigación los profesores del departamento publicaron ciento ochenta y dos (182) artículos científicos en revistas arbitradas.

Aún con la situación de la pandemia del Covid-19, las asociaciones estudiantiles continuaron realizando varias actividades de promoción de su asociación y cooperando en las actividades de alcance a escuelas y otras organizaciones. También el Planetario de Física y el Observatorio de Física continuó realizando actividades a través de las plataformas digitales, Zoom Facebook Live y Microsoft Teams.

En fin, este ha sido un año en el que nos ajustamos a nuestra nueva realidad de ofrecer nuestros servicios de una manera totalmente virtual. Las páginas a continuación dan una muestra de lo ocurrido durante el año 2020-2021 en nuestro Departamento.

B. Misión

El Departamento de Física, en consonancia con la Misión del Recinto Universitario de Mayagüez, se dedica a educar estudiantes para entender mejor y explorar fenómenos físicos, para aplicar pensamiento crítico en la formulación, análisis y solución de problemas, y para mantener un estándar profesional alto en sus carreras. También se dedica a avanzar la investigación en Física, y en otras disciplinas relacionadas. Se dedica también a promocionar la física en el ambiente universitario, en las escuelas del país, y en la comunidad en general.

Este año, la colación de grados se realizó entre el 24 y 25 de junio, siendo el 25 de junio el asignado para la Facultad de Artes y Ciencias. Completaron sus estudios nueve (9) estudiantes de Bachillerato en Ciencias en Física Teórica, seis (6) estudiantes de Bachillerato en Ciencias en Ciencias Físicas y cuatro (4) estudiantes de Maestría en Física. Durante el primer semestre del año académico 2019-2020, entraron 22 (veintidós) estudiantes al programa de Física Teórica y 13 (trece) al de Ciencias Físicas. El programa graduado de Física tuvo una (1) admisión durante el año académico 2020-2021 y para el primer semestre 2021- 2022 se esperan ocho (8) admisiones. Para poder educar mejor a estos estudiantes, nuestro departamento tiene varias iniciativas para añadir programas nuevos y revisar los existentes. Actualmente, se lleva a cabo la revisión del bachillerato de Ciencias Físicas, Física Teórica, y la del programa de Maestría en Física.

Se considera la posibilidad de crear un programa interdisciplinario con el Departamento de Ciencias Marinas en Ciencias Atmosféricas Marinas, así también se considera la posibilidad impulsar el doctorado en Física.

En el área de investigación el trabajo de la facultad del Departamento de Física ha sido divulgado en al menos veinte y siete (27) publicaciones científicas. En adición a estas publicaciones, la colaboración CMS (Compact Muon Solenoid) ha publicado por lo menos cincuenta y cuatro (155) publicaciones en las que participan el Dr. Sudhir Malik. En el área de servicio a la comunidad se destacó la propuesta de QuarkNet dirigida localmente por el Dr. Héctor Méndez que capacita a maestros de Física en temas de actualidad en la Física de Altas Energías.

Finalmente, nuestras sociedades estudiantiles contribuyen también a promover la Física, las Ciencias Atmosféricas, y la Meteorología y Astronomía como alternativas de una carrera profesional entre los estudiantes universitarios y los de escuela superior. Muchas de las actividades que tradicionalmente se hacen en el semestre, se realizaron virtualmente. En este documento se detallan las actividades realizadas por el Departamento de Física en aras de cumplir con la Misión del Recinto Universitario de Mayagüez.

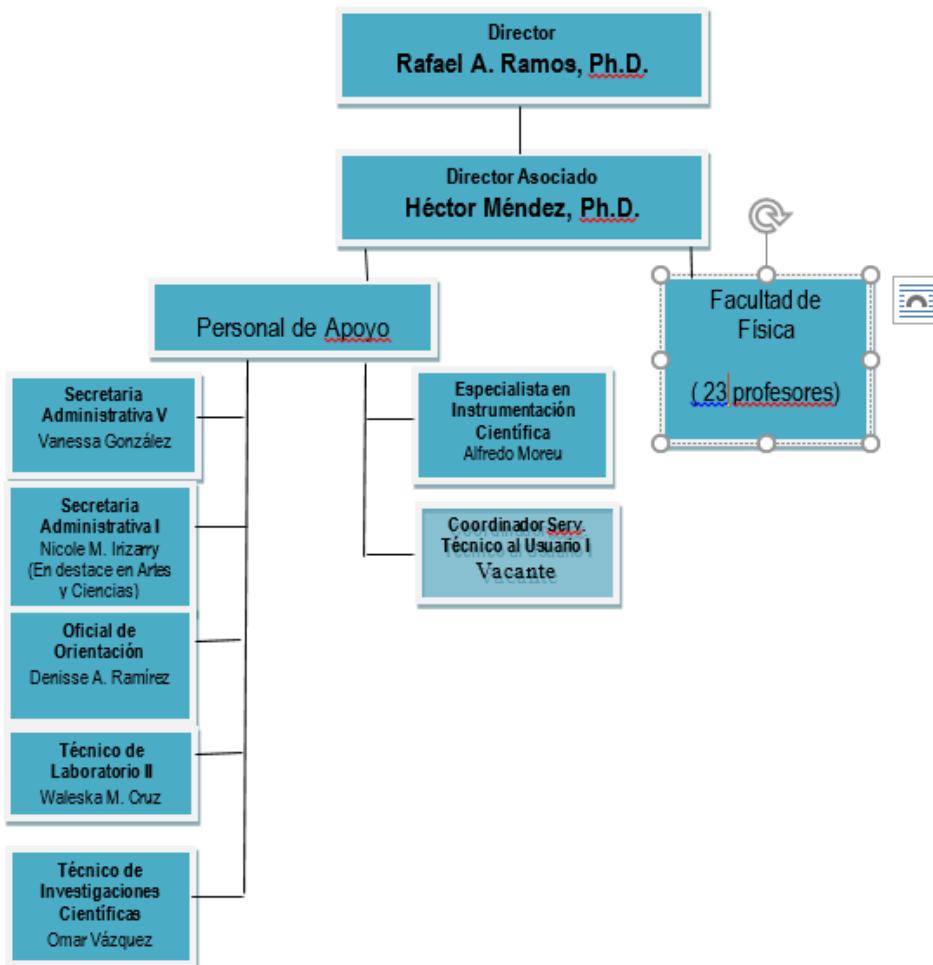
C. Estructura Organizacional

Personal No Docente (5) y Docente (23)

Organigrama del Departamento de Física

*Departamento de Física
Universidad de Puerto Rico
Recinto Universitario de Mayagüez*

D i a g r a m a O r g a n i z a c i o n a l



D. Institucionalizar una cultura de Planificación Estratégica y Avalúo

El plan estratégico del Departamento de Física aparece en el portal del Recinto Universitario de Mayagüez en la dirección <http://www.uprm.edu/cms/index.php/page/315>. Durante el año académico 2020-21, el Departamento de Física continuó a revisando el Plan Estratégico del Departamento de Física, el cual tuvo su última revisión durante el año académico 2009-10. El Departamento de Física comenzó a implementar parte del nuevo Plan de Avalúo Administrativo. La revisión del Plan Estratégico del Departamento de Física no ha concluido y esperamos poder continuar su revisión a principios del próximo año académico.

El Plan Estratégico actual del Departamento de Física está alineado con el Plan Estratégico de la Facultad de Artes y Ciencias 2012-2022 y con las metas de Diez para la Década: Agenda para la Planificación en la Universidad de Puerto Rico (2005- 2015). Esperamos que según el plan estratégico a nivel de la Universidad de Puerto Rico cambie, nuestro plan muestre el alineamiento necesario con este.

El Departamento de Física continúa enviando la Encuesta de Salida para sus egresados de todos los programas que ofrece el departamento. Esta encuesta se envió a todos los egresados a través de correo electrónico. Los resultados de las encuestas actualmente se están evaluando, y esperamos nos ayuden a actualizar todos los planes estratégicos, así como modificar nuestros ofrecimientos académicos.

E. Estar a la vanguardia de la educación superior en Puerto Rico garantizando que nuestros alumnos reciben la mejor educación

El Departamento de Física ha dirigido esfuerzos para fortalecer y expandir sus programas académicos, para así proveer una oferta académica de acuerdo a las necesidades de la comunidad estudiantil. Debido a la pandemia, todos nuestros cursos fueron ofrecidos asistidos por tecnología. Además, el Dr. Raúl Portuondo ofreció, por primera vez, el curso FISI 4127 – Metodología de la Enseñanza de Física.

Revisiones Curriculares

La revisión curricular del programa de Física la está realizando el Comité de Currículo departamental compuesto por el Dr. Carlos U. Pabón, el Dr. Samuel Santana y el Dr. Héctor Jiménez, Dr. Raúl Portuondo, y Dr. Henri Radovan. Este programa busca reducir el número de créditos del programa y aumentar las posibles opciones dentro de la física. Las opciones que se han considerado al presente son Bachillerato en Física con especialización en Física, Ciencias Atmosféricas y Meteorología, Física Computacional y Física Tradicional. Tomando en cuenta la revisión de los cursos de educación general que lleva a cabo el comité nombrando por el Senado Académico del RUM, el total de créditos en las tres opciones debe quedar en 127 créditos, 14 créditos menos que el total en el bachillerato de Física actual

Iniciativas para fortalecer la enseñanza

El Centro de Tutorías de Física no operó durante este año debido a la pandemia.

Fortalecimiento de instalaciones para uso académico

El Departamento de Física completó hace varios años la instalación de proyectores en todos los salones del Departamento de Física. En la actualidad los profesores tienen la alternativa de enseñar sus clases utilizando sólo proyector, pizarra o combinar ambos recursos.

El Departamento de Física también obtuvo la aprobación de dinero de la cuota de tecnología para reemplazar algunas computadoras de los Laboratorios de Física General. Así también varios salones comenzaron a remodelarse. Entre estos están el laboratorio de Electrónica localizado en el salón F-313, el salón F-226 en el cual se enseña el curso de Física General integrado con laboratorio para estudiantes de la especialidad en física. Es en este salón, F-226 donde se dictan los cursos nuevos del nuevo programa de Ciencias Físicas. El centro de cómputos del Departamento de Física se mudó hace varios años al salón F-437, y aún está en espera de mejorar sus facilidades durante el transcurso del año académico.

Actualmente, el Departamento tiene como meta cambiar todas las pizarras de tiza, así como reposicionar las pantallas de los proyectores para mejorar las clases que combinan proyector y pizarra simultáneamente, así también espera la instalación de equipo para dictar clases en modalidad mixta en el futuro cercano.

Oferta académica

La oferta académica continuó parecida a la de los últimos años. El esfuerzo más significativo fue el tener que adaptarlos y ofrecerlos asistidos por tecnología.

Actividades o competencias académicas

- a) **Brian Cruz (undergrad)** gave his IRIS-HEP Fellowship presentation on “*Translating analyses into prototype analysis systems*” IRIS-HEP Fellows Talks scheduled for June 2, 2021 <https://indico.cern.ch/event/1040812/>
Brian was awarded \$6000.00 “IRIS-HEP Fellowship” for Spring 2021 semester to work on with Dr.Jim Pivarski (Computational Physicist at Princeton University).
- b) **Scarlet Norberg** (postdoc) gave a plenary talk on “*Searches for SUSY Strong*” at Moriond/EW2021: Rencontres de Moriond 2021: Electroweak Interactions & Unified Theories, 21-27 Mar 2021, La Thuile (Italy)
- c) **Scarlet Norberg** (postdoc) gave a plenary talk on “*Overview of CMS results*” at Miami2020: Miami-2020, 13-19 Dec 2020, Miami (United States)
- d) **Alvaro Guerrero** (Master student) gave presentation on “*Characterization of pixel planar sensors for the inner tracker system of the phase 2 CMS detector*” at APS April 2021: American Physical Society April Meeting 2021, 17-20 Apr 2021, Video only (Virtual World)
- e) **Guillermo Fidalgo**, Physics Master Student, was awarded \$5000.00 for summer (June 1 to August 6, 2021) of 2021 for “*Pathways to CU Physics*” award from the University of Colorado - Supe Guillermo Fidalgo was awarded \$5000.00 for summer of 2021 – Supervisors Prof. Keith Ulmer (CU Boulder) and Sudhir Malik (UPR) on the joint research project “*New Trigger Strategies for Emerging Jets Search at CMS*”.

RECONOCIMIENTOS O PREMIOS

- a) **Armando Rúa-** “*Catedrático de Física recibe subvención de NSF para investigación sobre dispositivos que emulan funciones del cerebro*”, 5/3/2021

<https://www.uprm.edu/portada/2021/03/05/fisicoinvestigarasobredispositivosconfuncion-alidadescerebrales/>

“*Catedrático de Física del Recinto de Mayagüez de la UPR recibe subvención de NSF para investigación sobre dispositivos que emulan funciones del cerebro*”, 16/3/2021

<https://www.upr.edu/catedratico-de-fisica-del-recinto-de-mayaguez-de-la-upr-recibe-subvencion-de-nsf-para-investigacion-sobre-dispositivos-que-emulan-funciones-del-cerebro/>

“*Alante la Isla en investigaciones tecnológicas*”, 22/3/2021

<https://www.primerahora.com/estilos-de-vida/ph-mas-pa-aprender/notas/alante-la-isla-en-investigaciones-tecnologicas/>

“Catedrático del RUM investiga sobre computadoras que imitan el cerebro”, 15/3/2021

<https://www.metro.pr/pr/estilo-vida/2021/03/15/catedratico-del-rum-investiga-computadoras-imitan-cerebro.html>

“Catedrático del RUM investiga sobre computadoras que imitan el cerebro”, 15/3/2021

<https://www.woratv.com/catedratico-del-rum-investiga-sobre-computadoras-que-imitan-el-cerebro/>

F. Aumentar y Diversificar las Fuentes de Ingreso de la Institución

El Departamento de Física todos los años realiza esfuerzos para aumentar la cantidad de fondos externos obtenidos para realizar investigación científica de vanguardia, así como para fines educativos. Propuestas suelen someterse anualmente a agencias tales como la National Science Foundation (NSF), Department of Energy (DOE), y Department of Defense (DOD), y así como otras agencias similares del gobierno de los Estados Unidos y/o entidades sin fines de lucro. Igualmente, a nivel local se ha busca fondos del Departamento de Educación de Puerto Rico para fines educativos. La cantidad de fondos activos de investigación del Departamento de Física durante el año académico 2020-2021 totalizó la cantidad de **\$762,132**. Para el próximo año académico se estarán sometiendo nuevas propuestas para conseguir fondos externos.

- a. *Cantidad de fondos externos recibidos, por fuente, para investigación y labor creativa*

INVESTIGACIÓN – TOTAL: \$762,132.

NATIONAL SCIENCE FOUNDATION (NSF)	
Título:	Cantidad:
Understanding Phase-Change Nanodevices for Cognitive-inspired Computing Applications Funded amount: \$164,338 [01/31/2021 – 01/30/2023] (Dr. Armando Rúa)	\$90,265
Physics Beyond Standard Model with the CMS Pixel Detector – Funded amount: \$441,089 [1/Sep/2018-31/Aug/2021] (Dr. Sudhir Malik)	\$148,411
Ultrafast dynamics of iron-based superconductors Funded amount: \$ 498,609 [08/01/19 - 07/31/22] Dr. Sergiy Lysenko	\$171,206
Supporting Minority Serving Institutions in the Creation of a Diverse, Quantum-Ready Workforce [08/01/2021 - 07/31/2022] Dr. Sergiy Lysenko	\$134,723

NATIONAL SCIENCE FOUNDATION (NSF) (Collaborative Agreements with Princeton University)	
Collaborative Research: CyberTraining: CIC: Framework for Integrated Research Software Training in High Energy Physics (FIRST-HEP) Funded amount: \$124,342 [07/01/2018– 06/30/2021] (Dr. Sudhir Malik)	\$36,241
Institute for Research and Innovation in Software for HighEnergy Physics (IRIS-HEP) - (Dr. Sudhir Malik) Funded amount: \$103,475 09/01/2018 – 08/31/2023 Period of funding – September 1, 2020 through August 31, 2021 (NCE) Funding amount Requested - \$ 35,124.00	\$35,124
NATIONAL SCIENCE FOUNDATION (NSF) (Collaborative Agreements with Cornell University)	
<i>High Luminosity (HL) LHC CMS Detector Upgrade Project FPIX: Mechanics & Assembly"</i> Period of funding - 1 January 2019 to 31 March 2020 Period of funding - 1 April 2020 to 30 September 2021 (extended due to NCE) – Dr. Sudhir Malik	\$19,812
Department of Defense (DoD)	
Acquisition of an Excimer Laser System for Quantum Materials (Dr. Armando Rúa)	\$ 120,350
Femtosecond Laser System for Ultrafast Spectroscopy of Quantum Materials" (Dr. Sergiy Lysenko) [10/01/19 - 08/31/20]	\$ 6,000
NASA Innovative Advanced Concepts	
NIAC Phase II: THE MOST - The High Etendue Multiple Object Spectrographic Telescope (Dr. Sergiy Lysenko) Amount Funded: \$ 500,000 (UPRM received for student stipend only) [2019 –2021]	\$42,300

a. Total de propuestas sometidas y aprobadas, por departamento

DEPARTAMENTO DE FÍSICA	
Propuestas sometidas	12
Propuestas aprobadas	4

b. Cantidad de proyectos de investigación y labor creativa nuevos

DEPARTAMENTO DE FÍSICA	
Proyectos de investigación nuevos	2

c. Descripción breve de proyectos nuevos y en progreso que son de mayor impacto

Proyecto:	Descripción:
Collaborative Research Cybertraining: FIRST-HEP (Dr. Sudhir Malik)	Develop software and computer workforce.
Physics Beyond Standard Model with the CMS Pixel Detector (Dr. Sudhir Malik)	Look for Supersymmetry, pixel detector at the Large Hydron Collider. This project requested continuation of support for the 3-year period from 6/1/2018 to 5/31/2021 for the ongoing research program in experimental High Energy Physics (HEP) at the University of Puerto Rico Mayaguez (UPRM). The program is centered on the CMS experiment [1] currently running at the protonproton Large Hadron Collider (LHC) [2], at CERN in Geneva, Switzerland, and it draws on the expertise of the PI gained from the strong contribution to the CMS and DZero experiments in the past 17 years. The PI joined University of Puerto Rico Mayaguez (UPRM) as a tenure-track Associate Professor of Physics in July 2014 to establish and secure funding for a High Energy Physics research program. NSF awarded past funding for this program for a three period from 6/1/2015 to 5/31/2018. UPRM is the only institute pursuing research in High Energy Physics in Puerto Rico.
The Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP) (Dr. Sudhir Malik)	Develop the state-of-the-art software cyberinfrastructure for the HL-LHCat CERN, and other planned HEP experiments of the 2020's.
Ultrafast dynamics of iron-based superconductors (Dr. Sergiy Lysenko)	This research program focuses on understanding of fundamental processes of superconductivity (SC) and nonequilibrium dynamics of iron-based quantum materials (i.e. pnictides, oxypnictide and iron chalcogenides) at the fundamental timescales, and intends to elucidate the evolution of nonequilibrium phases upon photoexcitation.

<p>Supporting Minority Serving Institutions in the Creation of a Diverse, Quantum-Ready Workforce (Dr. Sergiy Lysenko)</p>	<p>To satisfy the workforce needs of the rapidly growing quantum industry and remain globally competitive, the U.S. must train an increasing number of quantum engineers and scientists. This requires reaching beyond the existing pipelines and providing equal resources to a broader range of communities. Success relies on a shift in educational approaches and recruitment strategies, coupled with a strong commitment from principle investigators (PIs) throughout quantum information sciences and engineering (QISE) fields. To guide these PIs and institutions in developing efficacious strategies for broadening participation in the quantum revolution, we must better understand the barriers faced by Minority Serving Institutions (MSIs), which train a disproportionately large number of underrepresented students who earn bachelor's degrees in STEM fields. To develop strategic and innovative recommendations, this proposal requests support for two two-day workshops entitled Supporting Minority Serving Institutions in the Creation of a Diverse, Quantum-Ready Workforce. We will hold the first workshop virtually on September 17 - 18, 2021 and the second one near the University of Puerto Rico on January 21 - 22, 2022.</p>
<p>Femtosecond Laser System for Ultrafast Spectroscopy of Quantum Materials (Dr. Sergiy Lysenko)</p>	<p>This is instrumental (acquisition) proposal to buy new state-of-the-art femtosecond laser system to conduct ultrafast spectroscopy measurements of quantum materials. This project has direct relation to the current proposal</p>

G. Implementar Procesos Administrativos Ágiles y Eficientes

El Departamento de Física aprobó hace tres años una revisión del Plan de Avalúo Administrativo. Este plan detalla las responsabilidades del Departamento alineadas con la misión del Departamento. La misión del Departamento es la enseñanza, la investigación y el servicio. Entre todos los servicios y procesos administrativos que ofrece el Departamento, se seleccionaron cinco (procesos) para ser evaluados. Estos procesos son los siguientes:

- 1) Proveer Consejería Académica a nuestros estudiantes.
- 2) Organizar y supervisar programa de tutorías a estudiantes subgraduados.
- 3) Promover la física a la comunidad académica por medio de Seminarios, Coloquios, y Simposios.
- 4) Coordinar y ayudar a cumplimentar la documentación requerida por la Universidad, como lo son los permisos de viajes, LD-T002 (antigua Forma 125 A), etc.

- 5) Promover y orientar sobre la física y las carreras en física a la comunidad no universitaria, principalmente a estudiantes de escuela superior.

Las métricas y la relación con los planes estratégicos del Departamento de Física, del Decanato de Artes y Ciencias, y del Recinto Universitario del RUM están detallados en la página web del Departamento de Física (<https://wordpress.uprm.edu/fisica/>).

H. Fortalecer la Investigación y Labor Creativa Competitiva

Publicaciones y presentaciones más relevantes

El Departamento de Física del RUM es uno de los departamentos académicos con mayor actividad de investigación en Puerto Rico. La facultad del departamento logra anualmente un gran número de publicaciones en revistas arbitradas. Algunas de estas publicaciones son subvencionadas por fondos externos obtenidos por la facultad del departamento. Estos fondos permiten que varios laboratorios del departamento cuenten con la instrumentación más avanzada actualmente, así como proveen ayudantías graduadas para nuestros estudiantes. La investigación también fortalece la preparación de la facultad que enseña cursos subgraduados y graduados en el departamento, permitiéndoles a nuestros estudiantes obtener una educación de excelencia y a la vanguardia de los últimos acontecimientos en las ciencias.

A continuación, presentamos una muestra de algunas **publicaciones sometidas o publicadas** (182 en total) durante el periodo entre **julio 2020 y junio 2021**:

JURY, MARK (16)

1. Mbhamali, T.W., and Jury, M.R. 2021. Climate-sensitivity of sugarcane yield in southeastern Africa, *Intl. J. Climatol.*, 1-14.
doi.org/10.1002/joc.7066
2. Jury, M.R., 2021, The climate of Madagascar, in *The new natural history of Madagascar*, Princeton Univ Press, (in press).
3. Jury, M.R., and Gaviria Pabón, A.R. 2021. Dispersion of Smoke Plumes over South America, *Earth Interactions*, 25, 1-14.
doi.org/10.1175/EI-D-20-0004.1
4. Jury, M.R. and Nieves-Jiménez, A.T. 2021. Tropical Atlantic dust and the zonal circulation, *Theor. Appl. Climatol.*, 143, 901-913. doi.org/10.1007/s00704-020-03461-4
5. Jury, M.R. 2021. Kenya hydro-meteorology monitoring and prediction, *Bull. Amer. Meteorol. Soc.*, (in press)
6. Jury, M.R. 2020. Resolution-dependent perspectives on Caribbean hydro-climate, *Hydrology*, 7, 93,
doi:10.3390/hydrology7040093
7. Jury, M.R. and Fontanez-Vazquez, I.L. 2020. Ozone structure in Caribbean hurricanes, *Heliyon*, 6, e05366,
doi:10.1016/j.heliyon.2020.e05366
8. Jury, M.R., 2020, Marine climate change over the eastern Agulhas Bank of South Africa, *Ocean Science*, 16, 1529-1544.
doi.org/10.5194/os-16-1529-2020
9. Jury, M.R. 2020, Coastal gradients in False Bay, south of Cape Town: what insights can be gained from mesoscale reanalysis?, *Ocean Science*, 16, 1545-1557. doi.org/10.5194/os-16-1545-2020
10. Jury, M.R. 2020. Sand transport in the northeastern Caribbean characterized by wind-wave-current data, *Ocean & Coastal*

Manag. 198, doi.org/10.1016/j.ocecoaman.2020.105363

11. Jury, M.R. 2020, Climate trends in the Cape Town area, WaterSA, 46, doi.org/10.17159/wsa/2020.v46.i3.8654.
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 (H.A. Radovan is co-author)
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 (accepted for publication in The Astrophysical Journal Letters)
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A continuación, presentamos una muestra de algunas presentaciones realizadas por miembros de nuestra facultad en el periodo entre julio 2020 y junio 2021

MALIK, SUDHIR

- a) **Brian Cruz (undergrad)** gave his IRIS-HEP Fellowship presentation on “*Translating analyses into prototype analysis systems*” IRIS-HEP Fellows Talks scheduled for tomorrow, June 2, 2021
<https://indico.cern.ch/event/1040812/>
- b) **Sudhir Malik** gave colloquium on “**CMS Phase-2 Inner Tracker Upgrade**”, TIPP 2021: International Conference on Technology and Instrumentation in Particle Physics, 24-29 May 2021, Virtual (Canada)
<https://indico.cern.ch/event/981823/abstracts/121124/>
- c) **Sudhir Malik** gave a Plenary talk on “**Software Training in HEP**”, at 25th International Conference on Computing in High-Energy and Nuclear Physics vCHEP2021, 17-21 May 2021, Virtual Conference
<https://indico.cern.ch/event/948465/contributions/4323647/>
- d) **Sudhir Malik** gave a remote talk “Software Training and Sustainable HEP” at Sustainable HEP workshop at CERN 28-30 June 2021
- e) **Scarlet Norberg** (postdoc) gave a plenary talk on “**Searches for SUSY Strong**” at Moriond/EW2021: Rencontres de Moriond 2021: Electroweak Interactions & Unified Theories, 21-27 Mar 2021, La Thuile (Italy)
- f) **Scarlet Norberg** (postdoc) gave a plenary talk on “**Overview of CMS results**” at Miami2020: Miami-2020, 13-19 Dec 2020, Miami (United States)
- g) **Alvaro Guerrero** (Master student) gave presentation on “**Characterization of pixel planar sensors for the inner tracker system of the phase 2 CMS detector**” at APS April 2021: American Physical Society April Meeting 2021, 17-20 Apr 2021, Video only (Virtual World)

Talleres Organizados por miembros de la facultad

MALIK, SUDHIR

On Campus (IRIS-HEP, FIRST-HEP projects)

- a) “*Arduino Micro Controller and C++ programming 2021 Feb Machine Learning Basics for STEM teachers*” - 5-16 2021 May -
<https://indico.cern.ch/event/1031199/>
- b) “*Machine Learning Basics for STEM teachers*” - 12-14 Feb 2021 -
<https://indico.cern.ch/event/998732/>
- c) “*Data Analysis for STEM teachers*” - 15 Jul - 16 Jul7 2020 -
<https://indico.cern.ch/event/927162/>

Off Campus (IRIS-HEP, FIRST-HEP, HSF Domestic/International Projects)

- a) **GitHub CI/CD Training** (virtual) - 16-20 Feb 2021 -
<https://indico.cern.ch/event/1001128/>
- b) **ML + GPU Training** (virtual) - 2-9 Nov 2020 -
<https://indico.cern.ch/event/958112/>
- c) **Virtual Docker Training** - 27-30 2020 July - (virtual) -
<https://indico.cern.ch/event/934651/>

Outreach

- d) **Malik** moderated Quarknet Fermilab Masterclasses (<https://quarknet.org/content/fermilab-masterclass-moderators-2021>)
 - 1. 5 March 2021 - Schools were from Shanghai, Singapore
 - 2. 23 April 2020 – Schools were from Manhattan (Kansas), Puebla BUAP (Mexico), Rio Janeiro, Mexico Edison, Mexico Ibero
- e) **Malik** moderated BAMS (Big Analysis on Muons 2021) on 26 May 2021 – Schools were from Brazil, Mexico and Poland.

I. Impactar a Nuestra Sociedad Puertorriqueña

Actividades dirigidas a estudiantes y jóvenes en edad escolar

El Departamento de Física del RUM cuenta con un péndulo de Foucault, un Planetario y un Observatorio Astronómico. Desde el año 1973, en que

fueron inauguradas, estas facilidades han funcionado ininterrumpidamente para la comunidad académica y el público en general.

El péndulo de Foucault consiste de una cuerda de acero conectada a una esfera metálica que oscila de un lado a otro bajo la acción de la fuerza gravitacional de la Tierra. El péndulo tiene un mecanismo que compensa por la pérdida de energía, y que mantiene la amplitud de oscilación mientras el plano de oscilación gira aproximadamente cada tres días. Su movimiento es una prueba de la rotación de la Tierra.

El Planetario es un salón de proyecciones cuya pantalla hemisférica simula la bóveda celeste. En esta pantalla podemos proyectar alrededor de 4,000 estrellas, simulando el cielo como se ve desde cualquier parte del mundo y en cualquier momento del año. El Planetario tiene cabida para 64 personas sentadas en butacas reclinables, permitiendo mayor visibilidad hacia la cúpula. El proyector de estrellas se encuentra en el centro del salón y es controlado desde una consola computadorizada.

Además de sus usos académicos en el Recinto, el Planetario es utilizado como complemento al currículo de ciencias de escuelas públicas y privadas de Puerto Rico en las áreas de Física, Astronomía, Ciencias Terrestres y del Espacio. Nuestro propósito primordial es el de ampliar los conocimientos y reforzar los cursos de ciencias en los tópicos sobre Astronomía a través de charlas interactivas dirigidas a estudiantes y maestros de K-12.

El Observatorio del Departamento de Física, tiene un telescopio reflector con espejo principal de 16 pulgadas de diámetro. Este telescopio es controlado por computadora y permite la transmisión de video de imágenes astronómicas obtenidas mediante una cámara CCD.

También se brindan servicios a la comunidad universitaria y del área oeste a través de las casas abiertas una vez al mes durante la noche. En estas actividades coordinamos la visita al Planetario y al Observatorio y los transportamos al fascinante mundo de la Astronomía.

A continuación, el informe tareas realizadas en el planetario durante el periodo comprendido entre julio 2020 y junio 2021.

ACTIVIDAD	LUGAR/PLATAFORMA VIRTUAL	PARTICIPANTES
Campamento #2NASA STEAM al Alcance de los Niños	ZOOM/Salas Eugene Francis	100 niños 9-13 años, maestros tutores, Recursos externos NASA
Moon to Mars Artemis Webinar for teachers	Adobe Connect app	Recourses NASA /KSC
NASA EPDC STEM Resources- NASA Star	Google Moody	Invitation a maestros K-12
Explore our Sister Planet Venus NASA STEM at Home or at School	Webex, Adobe Connet	Museum of Alliance members
NASA Glenn Research Center- Dra. Marla Pérez Director Conference	ZOOM	SEDS members
STEM Teaching Tips for Parents and Caregivers Webinars	ZOOM	K-12 teachers
NASA STAR en Español/Dr. Samuel García NASA Resources	ZOOM	K-12 teachers
Growing Beyond Earth Webinar, Nuevo Trail pepper	ZOOM	20 teachers
NISE Webinar: Lessons learned from a Summer of Physically Distance Earth and Space public Engagement	ZOOM	Informal STEM Educators
GBE Workshop	ZOOM	20 teachers from PR +
Seminario de Polinización GBE	TEAMS	20
Webinar GBE Fairchild botanic Garden Miami/FL. Comenzar adiestramientos para-Trail #2	ZOOM	20
Puerto Rico STEM Initiative con Exploration Ground System KSC	TEAMS, Facebook live	2,000+
MARS Farm – Nuevos invernaderos y materiales para Trail #2 Enrega a maestros	Presencial	11 escuelas
NASA Days Virtual/Dr. Lester Morales/ Pathways information	ZOOM	Estudiantes Universitarios -200

Carreras en NASA/ Dr. Samuel García	TEAMS, Facebook live	345 k-12 maestros
NASA STEM Better Together Conference	ZOOM	PRSGC Affiliates / 50 USA States
Nacimiento, Crecimiento y Muerte de una Estrella/Conferencia Dr. Juan G. González	ZOOM	38 maestros
Presentación Virtual del Planetario	TEAMS	Escuela Federico Degetau/Cabo Rojo [35]
Simposio Virtual Growing Beyond Earth	ZOOM	Presentaciones virtuales de escuelas en los 50 estados de USA y PR
Conferencia Dinámica del Sol /Dr. Juan González	ZOOM	Maestros 38
Presentación Virtual del Planetario	ZOOM	Escuela Longfellow San German 4y5 grado/75
Charla Cambio Climático/ Dr. Juan G. González	ZOOM	ASPIRA PR/16
Charla Cambio Climático /Dr. Juan González	ZOOM	Estudiantes 9-12/68
Charla Conceptos equivocados en Ciencias /Dr. Raúl Portuondo	ZOOM	Maestros k-12/25

Además, el Dr. Raúl Portuondo brindó atención a estudiantes de escuela superior que se preparan para Olimpiadas Internacionales de Física (un día).

J. Fortalecer el Sentido de Pertenencia y “Orgullo Colegial”

Actividades dirigidas a la comunidad en general

1. Orientación Estudiantes de Nuevo Ingreso

El **jueves, 6 de agosto de 2020** se realizó la orientación virtual a través de “Google Meet” a los **35 estudiantes** de nuevo ingreso (13 del Programa de Ciencias Físicas y 22 del Programa de Física Teórica). En la misma se discutieron los siguientes temas:

- Programas académicos que ofrecemos: Ciencias Físicas, Física Teórica y las Secuencia Curriculares: Física, Ciencias Atmosféricas & Meteorología y Astronomía / Astrofísica
- Asociaciones Estudiantiles: Sociedad de Estudiantes de Física (SPS), Sociedad Meteorológica de Puerto Rico (SMPR) y “Students for the Exploration and Development of Space” (SEDS)
- Matrícula

2. "Simposio de Investigaciones de Física – Práctica COOP y Verano 2020"

Se realizó el **martes, 27 y jueves, 29 de octubre**. En el Simposio presentaron 12 estudiantes los siguientes trabajos de investigación de verano:

"Classifying neutron resonances with a decision tree algorithm"

Estudiante: **Pedro J. Rodríguez Fernández**

Mentores: Dr. David Brown

Práctica COOP en: Brookhaven National Lab. – Upton, New York

Campo estudiado: Física Nuclear

"Understanding the correlation between NWS Impact-Based flash flood warning categories and various NWS flash flood tools"

Estudiante: **América R. Gaviria Pabón**

Mentores: Dr. Jill Hardy, Dr. Jonathan Gourley, Dr. Todd Lindley

Internado de verano realizado en: National Weather Center,

Norman Oklahoma

Campo estudiado: Ciencias Atmosféricas y Meteorología

"Self-sustained oscillations in 2D thermohaline convection"

Estudiante: **Zaibeth Carlo Frontera**

Mentores: Dr. John Whitehead y Dr. Olivier Marchal

Internado de verano realizado en: Woods Hole Oceanographic Institution

Campo estudiado: Oceanografía física/Paleoclimatología

"Effects of inner shelf currents on surf zone bathymetric rip currents"

Estudiante: **Luis Daniel Pérez Squeo**

Mentor: Dr. Greg Wilson

Internado de verano realizado en: Oregon State University

Campo estudiado: Oceanografía Física Costera

"Studying Jet Cross Section Measurements of ATLAS Experiment"

Estudiante: **Michelle Marrero García**

Mentores: Dr. Tancredi Carli / Dr. Sudhir Malik

Práctica COOP en: CERN (European Organization for Nuclear Research)

Campo estudiado: Partículas

"Viability of post-emission collimation of photoemitted electron beam"

Estudiante: **Pedro E. Rivera-Cardona**

Mentor: William Li / Dr. Jared Maxson

Internado de verano realizado en: CLASSE, Cornell University

Campo estudiado: Altas Energías y Física de Aceleradores

"A Deep Learning-Based Decision Support System for Individualized Adaptive Radiotherapy"

Estudiante: **Génesis Suárez González**

Mentor: Dr. Jun Deng

Internado de verano realizado en: Yale University- School of Medicine

Campo estudiado: Física Médica / Física Computacional

3. El jueves, **6 de mayo de 2021** se realizó el “**Cuadro de Honor y Graduación Virtual de Física**” con el propósito de reconocer a los **48 estudiantes** que pertenecen al Cuadro de Honor del año académico 2019-2020, al igual que, a los **19 estudiantes que recibirán los siguientes grados:**

- **6 - Bachillerato en Ciencias en Ciencias Físicas**
- **4 - Maestría en Ciencias en Física**
- **9 – Bachillerato en Ciencias en Física Teórica**



4. El Dr. Raúl Portuondo participó en conferencia en línea a Maestros de Física sobre Errores Frecuentes en la Enseñanza de la Física (Invitado por el Dr. González Lagoa en el marco del Programa de NASA Space Grant en una Serie de Conferencias para Superación de Maestros de Ciencias)
5. *Actividades realizadas por el Dr. Sudhir Malik dirigidas a la comunidad en general:*

- **Malik** is co-convener of Snowmass2021 Community Engagement Frontier: Career Pipeline & Development (<https://snowmass21.org/community/career>)
- **Malik** is co-convener of Snowmass2021 Community Engagement Frontier: Physics Education (<https://snowmass21.org/community/education>)
- **Malik** is organizing weekly Snowmass2021 Community Engagement Frontier: Career Pipeline & Development (<https://indico.fnal.gov/category/1156/>)
- **Malik** is organizing weekly Snowmass2021 Community Engagement Frontier: Physics Education (<https://indico.fnal.gov/category/1158/>)

- **Malik** is the co-convener of Training, Education and Outreach Coordinator for IRIS-HEP Project
- **Malik** is co-convener of Training working group of HEP Software Foundation (<https://hepsoftwarefoundation.org/workinggroups/training.html>)

ACTIVIDADES DE ORGANIZACIONES ESTUDIANTILES

1. SOCIEDAD DE ESTUDIANTES DE FÍSICA (SPS)

[2021 Chapter Report](#)

Chapter Name: SPS RUM CHAPTER

1: What did this academic year look like for your department?

At the University of Puerto Rico, Mayaguez Campus (UPRM) a very small number of students were allowed to take in-person classes. According to each of their Department regulations laboratory courses could have been held in-person but were not entitled to. With that said, during this academic year the Department of Physics at UPRM, provided online classes for the great majority of their students. Students who are part of the meteorology minor had in-person classes with some of their professors, as well as students taking Intermediate Physics Lab.

Activities were completely online. The Department held the Honor Roll via *Zoom*, as well as a congratulatory activity to graduation candidates. Whereas, our SPS chapter also adjusted to provide online activities to our members. We created a *Discord* channel where all our members could join through chat or video-chat. Through this tool our chapter hosted movie nights, game nights, and social nights. For professional activities, we used either *Google Meets* or *Zoom Meetings* in order to make it easy for anyone who was not part of our *Discord* channel to attend said activities. Thanks to the generosity of the speakers our chapter did not need to fund any activity during this academic year, therefore activities were free and open to anyone interested in physics.

Apart from our chapter's schedule, this academic year our group Women in Physics - Puerto Rico (WiP-PR) held various online activities, such as professional talks, seminars and others, to which invitations were extended to our members as well. Therefore, we got to create a good community within our SPS chapter and the WiP-PR group. This year we also hosted the Zone 6 Meeting in which we got a great participation from chapters all across zone 6 and were able to provide good talks and social activities. We also got reached out by the meteorology student organization at UPRM to form part of their annual *Weather Fest*.

In essence, our chapter tried to maintain the best communication with our members and students from the Department of Physics at UPRM in order to keep providing them with good physics

content, and a space to relax and feel at home. Thanks to our group chat, and social media we were able to host activities similar to those we used to do on campus.

2: How has your Chapter maintained a sense of community amongst SPS members this year?

Since this academic year we had to face the pandemic and all activities would have to be online, it was very hard for us to connect with our members. We decided to open up a discord channel to communicate with our members our activities and also perform some in the same channel more efficiently. It was more organized and effective for us to maintain contact with our members. A popular event held on discord were the game nights, we even had a “Among us Tournament” where people joined and played for the winning prizes. We also held study “rooms” where the members would study and chat with fellow friends in a more pleasing environment.

This year we were very focused on mental health since classes online are harder than expected and more draining and decided to have weekly meetings with different themes to have a sense of socialization and catch up with each other. It was like a healing therapy program for the members. During this semester we dedicated an entire month to work on our physical health and mental health at the same time. We did a month of yoga for mental health, which also helped the members with anxiety and stress relief since it was at the time where classes got harder. Since we think of each other as a big physics family it was very delightful “seeing” each other and sharing our experiences which felt like we were back to normal. This was the best way to check on our members and effectively maintain our SPS community active and healthy. We wanted to help our members explore the idea of an internship and grad school applications, so we decided to host panels with different universities and programs where they could be interested and apply to expand their horizons. We also did a research panel at the start of the year so that they would motivate themselves to start getting experience and exploring different physics fields in the hopes of finding their calling.

3: Describe your Chapter's/Club's activity with SPS.

In the fall of 2020 we had the privilege of hosting a virtual zone meeting on the 21st and 22nd of November. During which we had the privilege of receiving conferences on Medical Physics, Particle Physics and the intersection between Art and Physics, from experts within these fields. We also made sure to inform all present about the Graduate program in physics that the University of Puerto Rico at Mayaguez has to offer. For recreation we all played virtual games in which the participants could interact and get to know each other better, such as the accessible game “Among Us” (a game in which the players have to work together in order to deduce the identity of the imposter among them) and a Kahoot drawing game based on physics history, fun facts and concepts taught at an introductory level.

Steps are being taken to make it such that a large quantity of chapter members attend the upcoming PhysCon.

Despite the fact that it is more than a year until Physcon arrives, we wish to give our members the most amount of time to prepare logically and economically. We held a workshop with the sole purpose of better informing our members and any other students about what they could expect from attending. After informing these students we proceeded to assist them in the sign up process. The members of this year's directive made sure that the newly elected directive understands the importance of this matter and will proceed to help in any whatsoever given that is a huge priority for all.

This year we had a member of our chapter as zone 6 councillor, while we did not nominate a member from our chapter this year. We collaborated with the SPS chapter in University of Puerto Rico Rio Piedras in supporting the nomination and candidacy of one of their members to the post.

Though it was not able to be completed in this term, we have laid the foundation and commenced the process of founding a chapter of Sigma Pi Sigma in our university, thus making it less troublesome for the newly elected directive to continue on with the needed steps.

4: How has your Chapter engaged with your community?

Throughout the 2020-2021 Academic Year, we organized a series of professional activities that would contribute to our members' professional lives. We kicked off our first semester with a Research Orientation given by professors of our institution. We brought the professors Henri Radovan, Sudhir Malik, Erick Roura, and Sergiy Lysenko to discuss research topics on Astronomy/Astrophysics, Particle Physics, Theoretical Physics, and Optics. We also organized a Grad School Discussion in which we had MIT, MD Anderson, Boston University, Stanford University, and UC Berkeley as our invited institutions. Our objective with this activity was to give our members the opportunity to learn about other physics programs outside of our campus. Our final first semester activity was a Graduate Program Fair for the Zone Meeting. We invited Iowa State University to talk about Nuclear Physics, UNC at Charlotte with Optical Physics, Colorado School of Mines with Geophysics, and Michigan Technological University with Applied Physics. In our second semester we started with a Research Experience Program orientation. We invited speakers from the University of Chicago, Indiana University, University of Illinois at Urbana, and University of California so they could give us some insight into their REU programs. Aside from this, we contacted a former student of our university to teach us how to create our own WebPortfolio. Last but not least, we organized a Physics Discussion Panel with another set of professional speakers. We contacted a professor from MIT to speak about Nuclear Physics and a professor from the University of Texas at Austin with astrophysics. The discussed topics were previously selected by the members of our chapter.

Our chapter is known for going to schools and presenting demonstrations in order to share our knowledge and invite new students to our program, but this was an impossible thing to do at the time due to the pandemic. We started what we call "Physics Mondays" in which we uploaded short physics demonstrations to our Instagram platform so that we could practice our knowledge and spread it to the world. Making these 1-5 minute videos served as a great exercise

to improve our scientific communication skills and was also a fun way to increase the general public's interest in physics. We covered topics including sound waves, magnetism, string theory, among many more. Our members truly enjoyed it and the committee in charge did an excellent job at preparing different demonstrations each Monday for the community to see. This also provided a way to interact with our community as our followers on social media could comment on our video demonstrations and open up scientific discussions related to the videos we posted.

The Demonstration Committee also participated in the Puerto Rico Meteorological Society Annual Weather Fest by making a collaborative video explaining atmospheric optics. This stimulated interaction within our chapter, as our members had to work together to make a cohesive video, and was an opportunity to promote our chapter to students in other clubs and societies that might be interested in physics.

For Social Activities, we got the most engagement in our Mental Health Catch-ups, which enabled the students to talk about their week, and share discussions about general topics amidst the stress of this pandemic. The dynamic was centered in google meets and acted as a sort of talk-therapy. In one of the sessions, we had a psychologist join to inform us about coping with anxiety, a mental-health workshop. Many Game nights and Movie nights were hosted as well, but since the students had their time compromised with university work, we resorted to do the mental health catch-ups once every 2 weeks and got more engagement, since the students found that this activity was of good use of their time resource, leaving them feeling productive and relieved.

5: How has your Chapter interacted with the professional physics community outside of your college/university?

Our SPS chapter submitted a proposal for the NASA RASC-AL Competition Theme #1 Low-mass Lunar Habitat. In this effort, our goal was to give members the experience of working on a multi-disciplinary project and develop synergy and team-working skills as well as various technical skills. This project enabled our members to learn NASA Mission procedures and protocols as well. The members enhanced their critical thinking, effective communication and respect for field diversity. On a more technical aspect, the students had to work on Material Sciences for effective radiation mitigation, Lunar Science for identification of environmental risks, like lunar dust and its static properties, and orbital mechanics/astrodynamics for the mission landing. Other engineering skills were present as well, such as trade studies, structural engineering, preliminary design, communication and power systems. This team was composed of 28 SPS Members and various advisors and NASA mentors. These included: Dr. Eduardo I. Ortiz Rivera (UPRM), Dr. María D. Cortés-Delgado (UPRM), Mr. Lucas Staab Msc. (NASA Glenn Research Center) & Mr. Nelson Morales, MSc. (NASA Glenn Research Center). The habitat is called: R.O.M.A. Reusable Operational Modular Architecture. The project lasted from September 2020 to May 2021. Students had the option to enroll in a 2-credit research class (INEL4998) as part of the project and submitted various progress reports for the IEEE.



2021 RASC-AL ROMA Members.

6: How does your chapter connect alumni and the department?

The SPS UPRM Chapter has plans on celebrating the Sigma Pi Sigma Centennial. Our chapter connected with its alumni and the department with different social, professional, and educational activities. One of the activities done was the Mental Health Catch-Up that took place on Wednesdays biweekly. In this activity, participants talked about a topic and vent off about situations that are bothering them. Other activities are Game Nights, Workshops about mental health, college program talks, internship opportunities, and topics about physics (all offered online via Meets, Zoom, or Discord). The activities realized for the academic year 2020-2021 are:

1. Summer End (“Fin de Verano” Social Activity)
2. Undergraduate Investigation Orientation
3. Visit Animal Shelter
4. Graduate School Orientation
5. Stairs to Success
6. RASC-AL SPS, Category #1: Durable Low-Mass Lunar Habitat
7. John Hopkins University Orientation
8. Symposium
9. Resumé Workshops
10. Beach Cleanup
11. Art, A Convergence Point between Physics and Chemistry
12. Talk about Internship Opportunities
13. Web Portfolio Workshop
14. Sigma Pi Sigma + Physcon Talk
15. Mental Health Workshop
16. Physics Awards
- Physics Topics Talks

18. Game Nights
19. Physics Mondays
20. Mental Health Catch-ups

The SPS UPRM Chapter celebrated the Physics Awards on Wednesday, May 26. This activity showed the artistic talents that some of our members have (“Physics Got Talent”), provided membership certificates, announced the new directive for the academic year 2021-2022 and a social activity after the ceremony.

Highlight an activity or initiative your chapter is proud of this academic year. This may be published in an issue of *The SPS Observer*. (OPTIONAL)

Title: Women in Physics - Puerto Rico UPRM Group

Authors: Arianna H. Colón Cesaní

Point of contact for further questions: arianna.colon@upr.edu (President and Co-founder), womeninphysicspr@uprm.edu (Official correspondence)

*List of image names and captions and photo credit to include if published. Ex.
UMD_October_Outreach.jpg, SPS students build a spaceship with local children. Photo courtesy of Brad Conrad. For examples of published articles, check out the Features in the Winter 2020 issue of The SPS Observer: spsnational.org/the-sps-observer/issues/winter-2020*

The Women in Physics – Puerto Rico UPRM group (WiP-PR UPRM) began its journey in October 2019, when our members, Tamara González Acevedo and Arianna H. Colón Cesaní, submitted a proposal to the American Physical Society (APS) to form a group that would encourage more women and disadvantaged students to join the physics community, while providing them with the necessary tools to succeed in the field. After being awarded the grant from APS, the first and only group of women in physics in Puerto Rico was founded in January 2020. The following spring semester was spent creating a strategic plan to ensure the success of the group and bring together the directive board for WiP-PR UPRM. Later, in August of 2020, members were finally recruited and the group began coordinating its activities for the semester. Overall, WiP-PR UPRM has the mission of supporting and empowering women in physics in the professional, emotional, and social aspects of their career. The group underscores the difficult struggles women face in the scientific community and prepares the future generations of physicists to tackle them in the most efficient way.

WiP-PR UPRM also highlights the different career paths and opportunities available to undergraduate and graduate students, and it promotes fellowships, scholarships, and research programs that could boost the members’ professional growth. Furthermore, the group contacts professional women in physics that could potentially become role models for the students. Hearing first-hand the challenges that many women have faced throughout their careers, and how they overcame them, prepares the members for what lies ahead and inspires them to continue in their academic journey.

WiP-PR UPRM organizes workshops as a means to reach out even further to the future generations of science, technology, engineering, and mathematics students. It is our strong

belief that education is the key to battling and reducing social, educational, and economic disparities that affect so many students, especially in Puerto Rico and the United States. Women in Physics – Puerto Rico UPRM has made it its mission to support historically marginalized communities and to facilitate more opportunities for underrepresented students in physics. The group prioritizes diversity in STEM and plans on reaching out to high schools and universities to encourage practices that increase equity in academia and the workforce. Its biggest success has been uniting students and professors from all over Puerto Rico who share a common interest in physics and supporting women in the field. Due to the virtual transition of most activities as a result of the Covid-19 pandemic, WiP-PR UPRM was able to reach people from many different campuses, universities, and even high school teachers and professors, not just students from the University of Puerto Rico (UPR) at Mayagüez. This led the group to include representative students from UPR-Humacao and UPR-Rio Piedras in the Directive Board of Members. Leaders from other campuses were also encouraged to apply for the 2021 Women in Physics (WiP) grant to create more groups in Puerto Rico. By expanding throughout the island, WiP-PR UPRM reached more women and underrepresented minorities.

The group accomplished to unite people from a broad range of backgrounds, majors, ages, and genders around the island and created a connection between professional women already in the field and students who aspire to contribute to the scientific community as minorities in STEM. Overall, this chapter's highlight has been creating a safe space and a welcoming community for students with a passion for physics all over Puerto Rico. In the future, the group aspires to host a Conference for Undergraduate Women in Physics (CUWiP) here as well.

Some of the activities that were carried out throughout the year included:

1. Info session and Professional Women in Physics Talk
2. Kilter Rewards 30-day fitness challenge
3. Be Successful Talk
4. WiP-PR UPRM “Women Wednesday” Conversations
5. Puerto Rican Physicists Panel (“Panel de Físicas Boricuas”)
6. Resume Workshop with Dr. Midhat Farooq from APS
7. 2020 Initiation
8. University of Notre Dame Masters Program Info-session
9. Women in Physics Panel with Dr. Mayda Velasco and Dr. Li Fang
10. Mental Health Talk with CAPS representative from UCF
11. Space Exploration Talk with Anna McGilvray from the Arecibo Observatory
12. Ethics and Logistics of Terraforming & Colonizing Mars Talk with Autumn Shackleford (UCF)
13. Industry and Academia Jobs in Physics Panel with Dr. Tracey Becker, Dr. Zahra Hooshmand, and Shammir Maldonado Rivera
14. Game Nights
15. Movie Nights
16. Just Dance Virtual Dance Parties

Many of these activities were done in collaboration with the University of Central Florida (UCF) and other student organizations at the University of Puerto Rico in Mayagüez. Overall, the objectives of the group have been to form a community of people genuinely interested in advocating for the inclusiveness of women in physics, creating awareness about gender equality issues in academia as well as the workplace, and helping students reach their full potential through a variety of activities, seminars, workshops, and networking events.

To conclude, Women in Physics-Puerto Rico hopes to guide young women in the right direction towards achieving their professional goals.



Announcement of the APS Women in Physics Group Grant result at CUWiP 2020 in South Dakota, USA (Jan. 2020).



Founding members of Women in Physics - Puerto Rico UPRM (Feb. 2020). From left to right: Génesis Suárez, Caryelis Bayona Figueroa, Arianna Colón Cesaní, Margarita Rodríguez Matos, Tamara González Acevedo, and Nohely Miranda Colón.

Sociedad Meteorológica de Puerto Rico
Capítulo Estudiantil afiliado a la
American Meteorological Society (AMS)
UPR – RECINTO UNIVERSITARIO DE MAYAGÜEZ
Informe Presidencial
Año Académico 2020 - 2021

La Sociedad Meteorológica de Puerto Rico se enfocó en continuar con el legado de educar e informar tanto a los miembros del Capítulo Local como al público en general. Es importante destacar que la SMPR cuenta con una división llamada el UPRM Laboratory, el cual trabajó y continúa con su labor diaria de brindar los pronósticos del tiempo y los avisos que comparte el NWS San Juan, para el público en las redes sociales.

A pesar de ser estudiantes y tener una agenda cargada donde el enfoque son los estudios, nuestros miembros como símbolo de excelencia se han destacado en los pasados meses siendo aceptados en programas para universidades como Penn State University, NOAA EPP, University of Albany, entre otros. Demostrando el talento que hay en nuestra organización y en el Recinto Universitario de Mayagüez.

Directiva 2020 - 2021 y sus Comités

La Directiva 20 - 21 fue seleccionada a finales del primer semestre del año académico 2020 – 2021. La misma está compuesta de la siguiente manera:

- Presidenta – Niwdé M. Rivera
- Vicepresidente – Janluis Rivera
- Tesorera – Gabriela Figueroa
- Secretario – John Pérez
- Historiadora – Yamilex Ortiz
- Editora de Revista – Zaibeth Carlo
- Web máster – Juan Fontánez

Los Lideres y Co-líderes de los diferentes comités que componen la asociación son:

- Demostraciones
 - Rayshya Rosado
- Weather Briefings
 - Juan Colón
 - Eviel Hernández
- Outreach
 - Victoria Díaz
 - Raisa Rodríguez

Actividades

Debido a la situación mundial del COVID-19, las actividades se realizaron 100% online lo que nos ayudó a poder contar con espacios de conversación con profesionales en las áreas de la meteorología y las ciencias, que se encuentran fuera de Puerto Rico. Meteorólogos como Yaitza Luna, Mayra Oyola y Isha Renta, brindaron talleres sobre la importancia de la comunicación científica, cómo llegaron a la posición de hoy día, entre otros. Además, contamos con varios profesionales del Servicio Nacional de Meteorología que nos brindaron mas información sobre la variedad de avisos y advertencias con los cuales el NWS cuenta y lo que representan cada uno. Logramos de igual manera, unirnos en alianza con la UPR de Cayey, para tener un conversatorio junto a John Morales. De la misma forma, recientemente tuvimos la oportunidad de tener un conversatorio con la meteoróloga Ada Monzón, quien nos compartió que la profesión en la que ejerce ha sido ha sido el espacio en el cual puede servirle al pueblo.

Proyectos Nuevos

Como parte del esfuerzo de la SMPR por ser cumbre para el crecimiento del estudiantado en la meteorología, se impulsó el Internado Virtual de Comunicación Científica. El mismo, es liderado por la meteoróloga Karuska Matos, quien es egresada de nuestra institución.

Logros durante el pasado año

Durante el mes de enero del 2021, nuestro capítulo estudiantil se alzó con el Primer Lugar en la Categoría de Póster en el AMS (Sociedad Americana de Meteorología). Dicho póster, enfocaba la importancia que tiene el Observatorio de Arecibo para nosotros como estudiantes y para la ciudadanía de nuestra isla. También, gracias a este premio pudimos decir presente en el canal 4, y visitar los predios de WAPA para compartirle las buenas nuevas del premio al país.

En adición, se logró llevar a cabo mediante las redes sociales el Festival del Weather Fest 2021. Evento cumbre de nuestra organización para la comunidad. Organizaciones como Sea Grant, Caricoos y la SPS, brindaron su apoyo con videos educativos para el público. De igual manera, recientemente se logró culminar la Revista Juracán 2021 (revista que por años se ha realizado en la SMPR) que se estará compartiendo en los medios prontamente.

Agradecimientos

La Sociedad Meteorológica de Puerto Rico ha demostrado más que nunca que en la adversidad nos mantenemos unidos como familia, porque solo trabajando mano a mano como equipo podemos llegar lejos. Cabe destacar, que la Directiva 20 – 21 y los líderes y colíderes trabajaron arduamente durante los pasados meses para llevarle las mejores actividades tanto a sus compañeros de la organización como al público en general. Las redes sociales han sido el foco para llegar a los hogares y enfatizar lo importante que es: la meteorología, las ciencias atmosféricas, pero esencialmente el estudio de las ciencias para estar preparados en caso de cualquier evento. El mayor agradecimiento a todos los profesores que de alguna manera u otra han brindado su ayuda a los miembros de nuestra organización y con esto, que estén mas cerca de cada una de sus metas.

Niwdé M. Rivera Maldonado
Presidenta 2020 - 2021

Informe secretarial: 2020-2021
Redactado pro: John Daniel Pérez Cuesta
Fecha: 4 junio 2021

“Todos aprendemos en algún momento, y es importante enfocarnos en que hay que persistir”, así Ada Monzón expresó en el último taller que recibieron los miembros de la Sociedad Meteorológica de Puerto Rico (SMPR) en el año académico 2020 -2021. La SMPR siempre ha destacado la importancia de la comunicación y el servicio a las comunidades de todas las edades, y aun durante las circunstancias de la pandemia, supo mantener a flote la misión y visión de educar. En adelante, se desglosarán brevemente las actividades que la SMPR realizó durante este año y el trabajo arduo que compilaron cada uno de los integrantes del Comité Ejecutivo 2020-2021. Cabe destacar que este año la SMPR fue guiada por los siguientes miembros: Niwdé M. Rivera Maldonado (Presidenta), Janluis Rivera Ramos (Vicepresidente), Gabriela P. Figueroa Reyes (Tesorera), John D. Pérez Cuesta (Secretario), Yamilex Ortiz Ortiz (Historiadora), Juan C. Fontánez Castro (Webmaster) y Zaibeth Carlo Frontero (Editora de Revista).

Informe de actividades realizadas SMPR

(septiembre 2020-mayo 2021)

SEPTIEMBRE

- *8 septiembre 2020:* Se ofreció la asamblea virtual para estudiantes interesados en las ciencias atmosféricas y meteorología. La SMPR logró reclutar cinco miembros nuevos de distintas ramas de STEM.
- *29 septiembre 2020:* Se realizó la primera reunión virtual del año académico 2020-2021 y se discutieron los planes para el resto del semestre.

OCTUBRE

- *29 octubre 2020:* Se realizó la reunión virtual del mes de octubre.

NOVIEMBRE

- *17 noviembre 2020:* La meteoróloga Karuska Matos colaboró con la SMPR y ofreció un taller virtual sobre las destrezas de comunicación científica en los medios de televisión.

DICIEMBRE

- *29 diciembre 2020:* La Dra. Mayara Oyola ofreció un taller virtual sobre los procesos de preparación para aplicar a los internados y a la oportunidad de estudios graduados.

ENERO

- *21 enero 2021:* Se realizó la reunión virtual de enero.
- *22 enero 2021:* La meteoróloga Fernanda Ramos García ofreció un taller virtual sobre las funciones de un meteorólogo en el NWS y cómo funciona esta institución.
- *28 enero 2021:* El meteorólogo Ernesto Rodríguez compartió un taller virtual con la SMPR sobre la importancia que tiene el NWS y la diversidad en ella dentro de Puerto Rico y los otros territorios de los Estados Unidos.
- *30 enero 2021:* Se inició oficialmente a los miembros nuevos y al comité ejecutivo de la SMPR. Adicional, se realizó una dinámica de confraternización virtual con los miembros.

FEBRERO

- *11 febrero 2021:* La Dra. Yaíta Luna, fundadora de la SMPR, dirigió un taller motivacional para los estudiantes para que se enfocaran en emprender en sus respectivas carreras dentro de las ramas de STEM.

MARZO

- *7 marzo 2021:* El estudiante graduado, recién graduado del RUM, Marcel Corchado Albelo dirigió un conversatorio virtual sobre las oportunidades que los estudiantes encuentran a partir del “networking” y las diferencias significativas que se encuentran en el camino hacia escuela graduada.

- *24 marzo 2021:* La meteoróloga Isha Renta López dirigió un taller virtual sobre mantener las raíces con la cultura puertorriqueña en una carrera como la meteorología.

- *27 marzo 2021:* Reunión mensual virtual

ABRIL

- *20 abril 2021:* Se recibió un taller por Mayra Oyola sobre las destrezas necesarias que los estudiantes de STEM necesitan para continuar una carrera profesional en el campo de las ciencias atmosféricas.

MAYO

- *26 mayo 2021:* La meteoróloga Ada Monzón ofreció un taller virtual sobre las fuentes científicas que los meteorólogos necesitan navegar para poder respaldar sus pronósticos y también las maneras en que uno lo comunica de forma apropiada a través de los medios de comunicación.

ACTIVIDADES DIRIGIDAS A COMUNIDAD UNIVERSITARIA:

a) **Malik** organized Physics Department Colloquium

Date: 22 October 2020

Title: "Deep Learning for High-Energy Physics and Strong Gravitational Lensing Cosmology"

Speaker - Professor Sergei Glyzer, Department of Physics and Astronomy, University of Alabama

b) **Malik** organized Physics Department Colloquium

Date: 12 November 2020

Speaker: Dr. Raul Briceno (Professor at Department of Physics, Old Dominion University and Theory staff member at Jefferson Lab)

Title: Sketches from the exotic world of quarks and gluons

c) **Sudhir Malik** gave three talks on his project at FERIA DE INVESTIGACIONES, University of Puerto Rico, Mayagüez Campus (UPRM) – 1st VIRTUAL RESEARCH FAIR, 11-12 March 2021
<https://www.uprm.edu/feriadeinvestigaciones/1989-2/investigaciones-ac/>

1. “Physics Beyond Standard Model with the CMS Pixel Detector”

<https://www.uprm.edu/feriadeinvestigaciones/physics-beyond-standard-model-with-the-cms-pixel-detector/>

2. “Collaborative Research: CyberTraining: CIC: Framework for Integrated Research Software Training in High Energy Physics (FIRST-HEP)”

<https://www.uprm.edu/feriadeinvestigaciones/collaborative-research-cybertraining-cic-framework-for-integrated-research-software-training-in-high-energy-physics-first-hep/>

3. “S2I2: Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP)”

<https://www.uprm.edu/feriadeinvestigaciones/s2i2-institute-for-research-and-innovation-in-software-for-high-energy-physics-iris-hep/>

- d) **Guillermo Fidalgo and Yarelis Acevedo** with other members of Scientific Software Club at UPRM did workshop on

1. **2nd Python Workshop (Virtual Meeting) – 2 May 2020 (100 UPRM students signed up)**

The events are listed here: <http://ssc-uprm.herokuapp.com/>