



# Paying Tribute to Arecibo Observatory, a Legacy Beyond Science

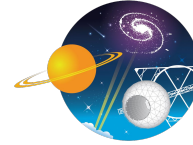
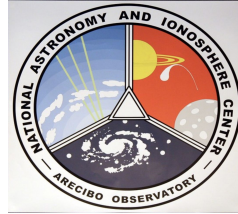
Luisa Fernanda Zambrano Marin



UCF

Florida Space Institute

UNIVERSITY OF CENTRAL FLORIDA



ARECIBO OBSERVATORY  
PUERTO RICO  
SRI • UMET • USRA



ARECIBO OBSERVATORY  
PUERTO RICO



*Arecibo Science Advocacy Partnership, Lunch Meeting, July 2 2024*

## Not a talk about

- Why it was built
- How it worked
- The science done there
- What happened to the facility
- What is next for the site

## It's about

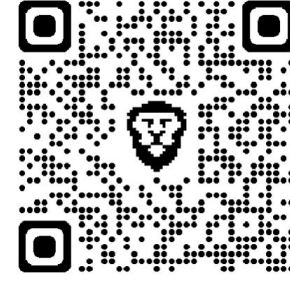
- The faces of the people who built it
- The faces of the people who worked there
- The families and bonds formed
- A Tribute to their contributions that made our science possible

# AO History Resources



SP-4218 "To See the Unseen"-  
Nasa History

An Oral History of  
the Arecibo  
Observatory



The Internet Archive,  
Wayback Machine

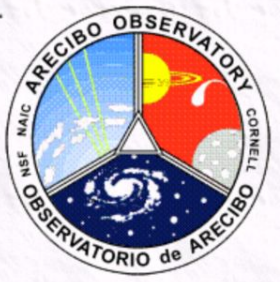
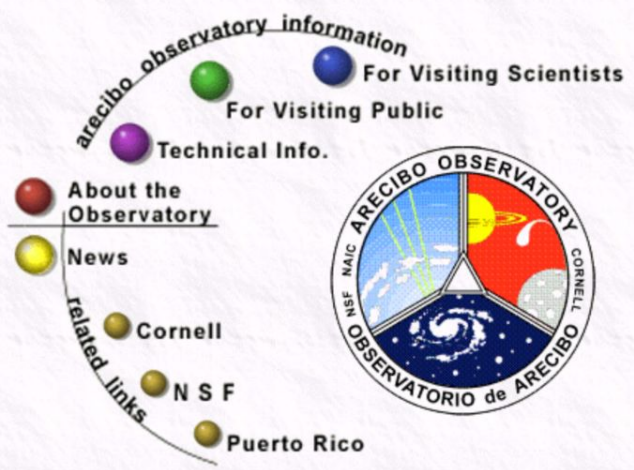
**Arecibo Ionospheric  
Observatory records**

Division of Rare and Manuscript  
Collections Cornell University Library



**QR codes takes you to  
references!**

# National Astronomy and Ionosphere Center



# Arecibo Observatory

*Largest radio telescope on Earth*

Operated by Cornell University under a Cooperative Agreement with the National Science Foundation

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[cornell](#) / [nsf](#) / [puerto\\_rico](#)



# Incoherent Scattering of Radio Waves by Free Electrons with Applications to Space Exploration by Radar\*

W. E. GORDON†, MEMBER, IRE

*Summary*—Free electrons in an ionized medium scatter radio waves weakly. Under certain conditions only incoherent scattering exists. A powerful radar can detect the incoherent backscatter from the free electrons in and above the earth's ionosphere. The received signal is spread in frequency by the Doppler shifts associated with the thermal motion of the electrons.

On the basis of incoherent backscatter by free electrons a powerful radar, but one whose components are presently within the state of the art, is capable of:

- 1) measuring electron density and electron temperature as a function of height and time at all levels in the earth's ionosphere and to heights of one or more earth's radii;
- 2) measuring auroral ionization;
- 3) detecting transient streams of charged particles coming from outer space; and
- 4) exploring the existence of a ring current.

The instrument is capable of

- 1) obtaining radar echoes from the sun, Venus, and Mars and possibly from Jupiter and Mercury; and
- 2) receiving from certain parts of remote space hitherto-undetected sources of radiation at meter wavelengths.

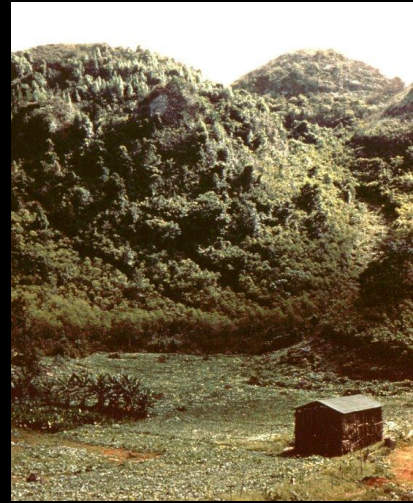
\* Original manuscript received by the IRE, June 11, 1958; revised manuscript received, August 25, 1958. The research reported in this paper was sponsored by Wright Air Dev. Ctr., Wright-Patterson Air Force Base, O., under Contract No. AF 33(616)-5547 with Cornell Univ.

† School of Elec. Eng., Cornell Univ., Ithaca, N. Y.

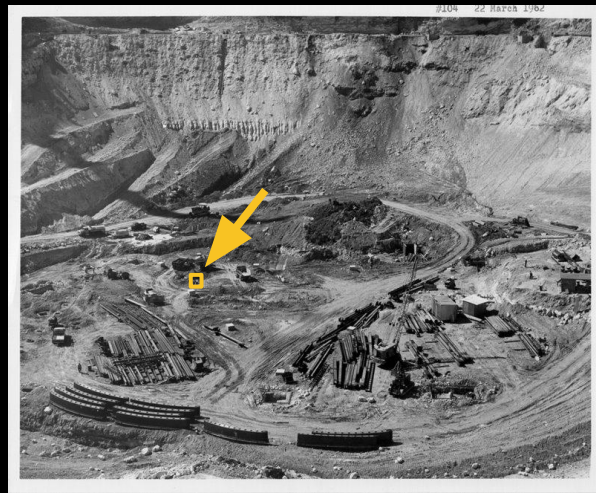
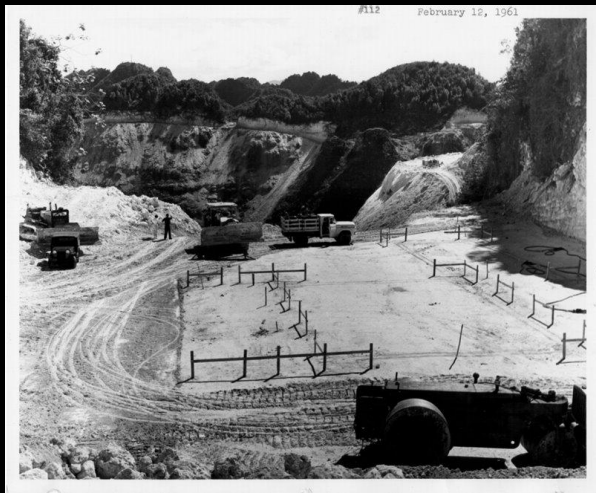
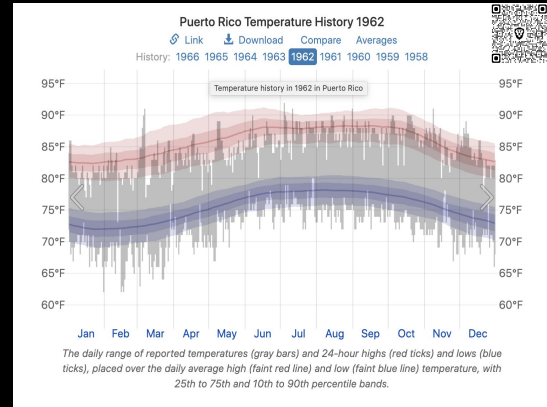


*Proceedings of Institute of Radio Engineers ( Proc IRE 58)*



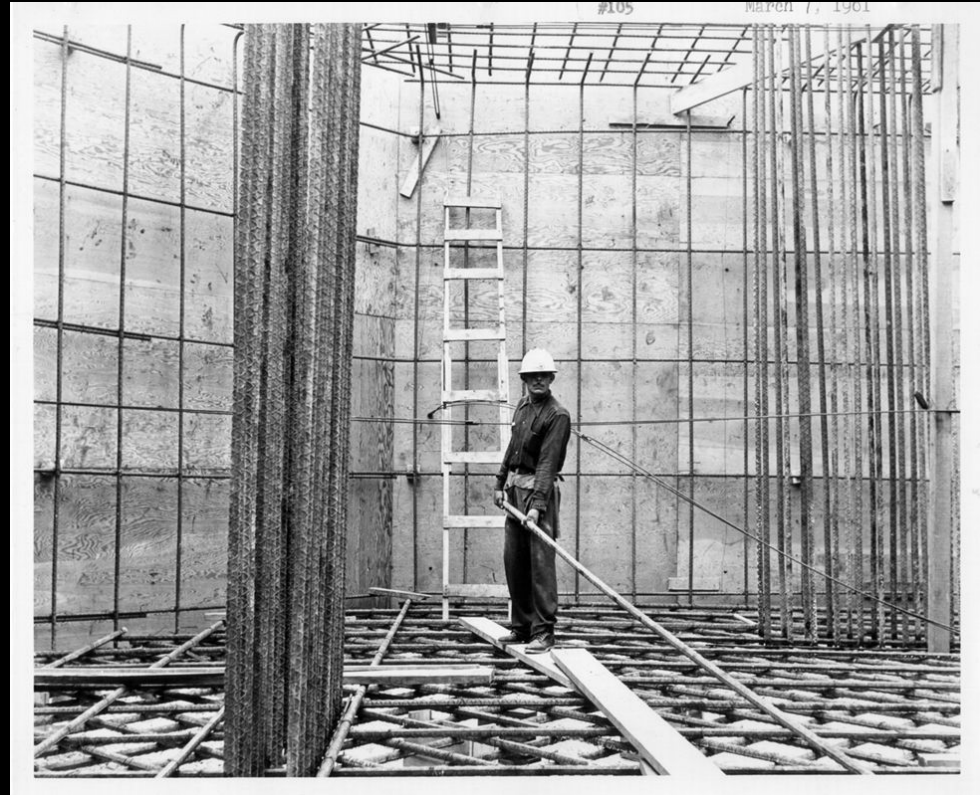


# 1961



# 1962

# 1963







11 January 1963



July 1963



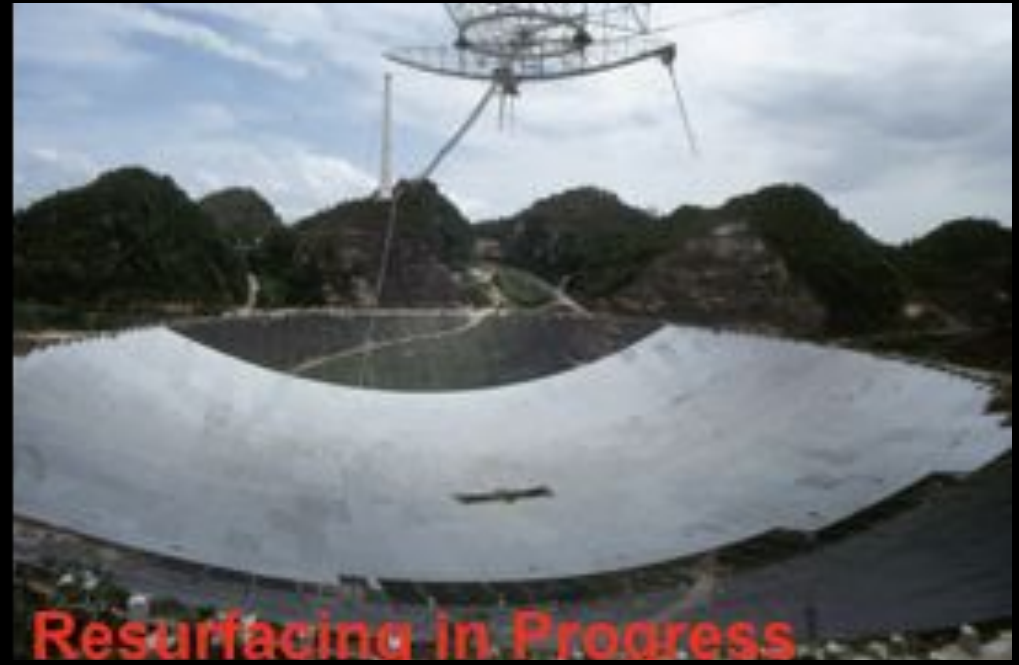
#106 19 Jan. 1962



28 February 1963

1963

FEBRUARY 29, 1963 CATWALK FINISHED



# Reflector Resurfacing 1972-74

# In house | manufacturing

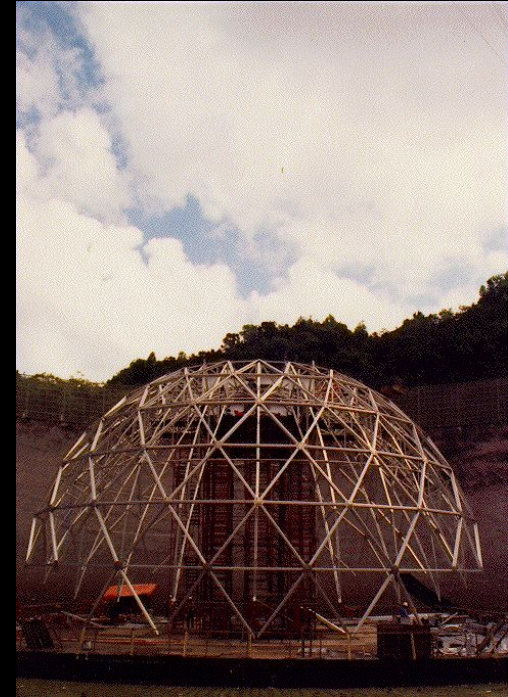


# Machine Shop



# How many panels?





Placing anchor 5 circa 1998

May 16  
1996



# On-site LEADERSHIP

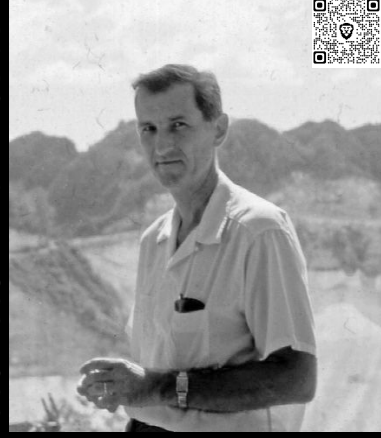
Directors throughout the years



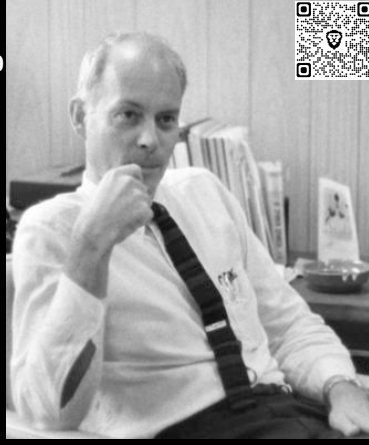
1966-1968 Frank Drake



1960-1965 William E. Gordon



1968-1971 Gordon Pettengill



Rolph Dyce 1963-1965



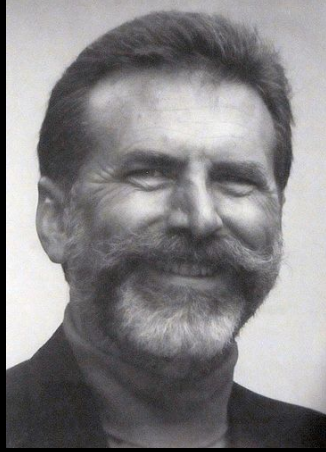
1971-73, 1982-92 Tor Hagfors



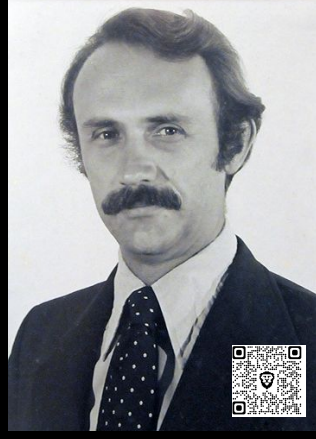
1965-1966 John W. Findlay



1988–1992 Michael M. Davis



1973–1982 Harold D. Craft Jr



1992–2003 Daniel R. Altschuler



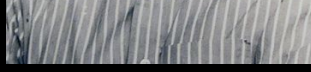
Interim  
1982–1987 Donald B. Campbell



2003–2006 Sixto A. González



1987–



Martha Haynes & Riccardo Giovanelli



2016–2022 Francisco Córdova



2007–08, 2011–15 Robert B. Kerr



2022–2023 Olga Figueroa



2008–2011: Michael C. Nolan



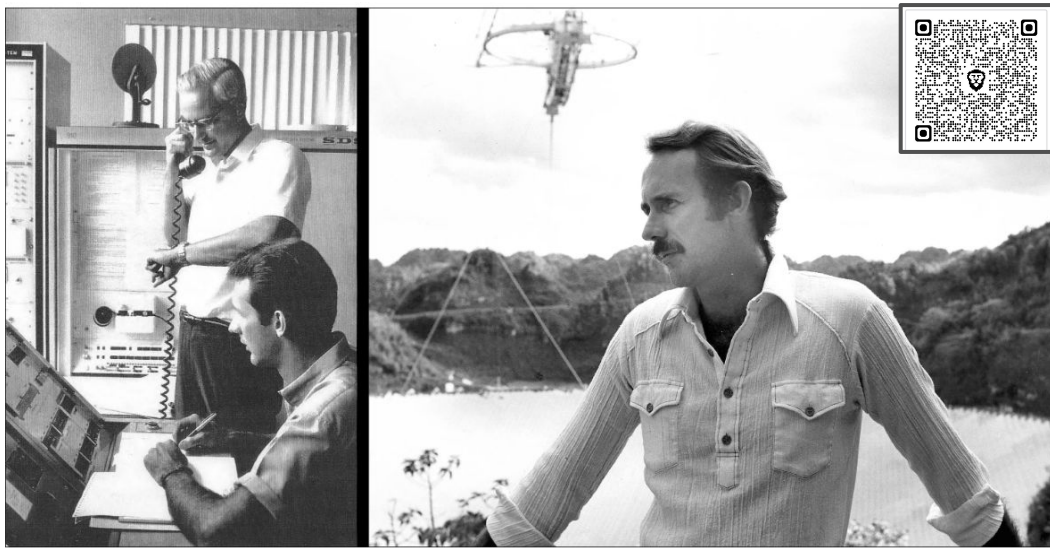
Deputy Director  
2015–2016 Joan Schmelz

2023- Arcibo C3  
Wanda Diaz-Merced

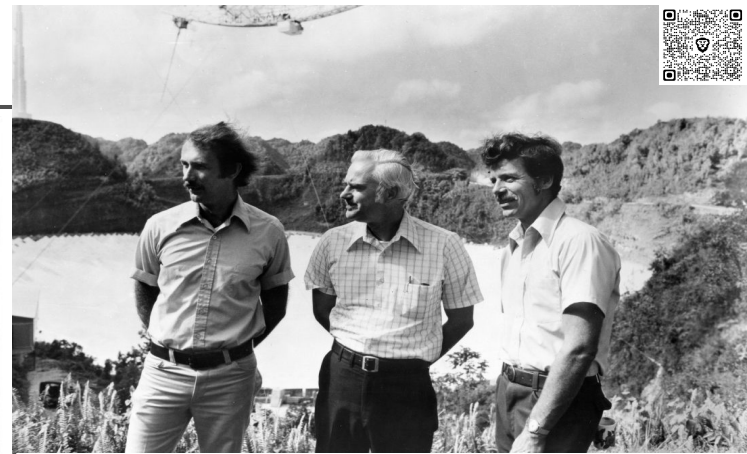


# THE PEOPLE

—  
Hundreds of employees throughout the years; Families,  
community, personalities, International community.



Frank Drake (standing) and Hal Craft at Arecibo, circa 1968 (left). Hal Craft at Arecibo in the 1970s (right). Office of Public Information, Visual Services, Cornell University. Reproduced with permission of the Division of Rare and Manuscript Collections, Cornell University.



© Cornell/Capa

Bottom: William Gordon (left) and programmer Robert Forrest (right) in the control room of the Arecibo Observatory

# Arecibo Observatory early 1961 Staff



Dr. William E Gordon



Al Johnson



Merle LaLonde



Secretary Gladys



Dr. Tom Talpey



George Peter



Eng. Miguel A Feyjóo



Tech. José Lopez

# Late 1961 Arecibo Observatory Staff



1968



**Ileana Barreto (left- librarian) and Ada Cardona (right-Dr. William E. Gordon secretary)**



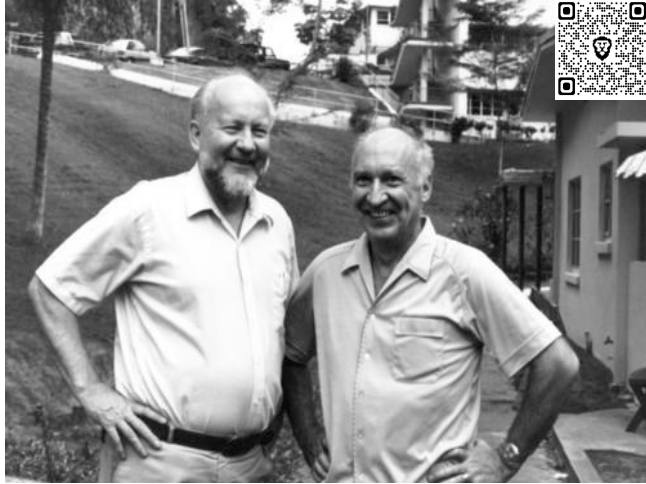
**SECRETARIES: Marie Luisa Delgado ( Director); Carmen Milagros Candelaria (Electronics); Mercedes Vives (Scientist); Marta Monroig and Ana Rodríguez**





Photo by Tony Acevedo.  
Edith Alvarez serves up some cake for  
Carmen Pantoja at her post-defense  
party.

# 1970s



Tor Hagfors (left) and Colin Hines (right)



On the left is Theodore Gilliland at the Arecibo Observatory in Puerto Rico in the 1960s. On the right is his son, Clinton Gilliland, at the site in 1971. PHOTOS: CLINTON GILLILAND



Photo by Tony Acevedo.

From left to right: Jo Ann Eder, Carmen Pantoja, Kiriaki Xilouris, Paul Castleberg, Murray Lewis, Alice Hine, Chris Salter, Luca Olmi, Willem Baan, Daniel Altschuler, Tapasi Ghosh, Mike Davis, John Harmon.



Photo by Tony Acevedo.

From left to right: Jonathan Friedman, Brett Isham, Mike Sulzer, John Cho, Susan Nossal, Sixto González, Qihou Zhou, Bob Zimmerman, Craig Tepley.

# 1980s

## Comings and Goings

*¡Se retira Don José!*

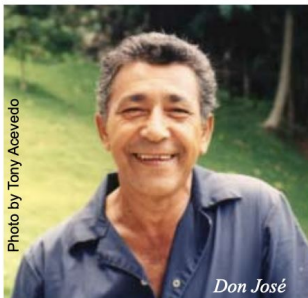


Photo by Tony Acevedo

*Don José*



Miguel Irizarry. Photo by Tony Acevedo.

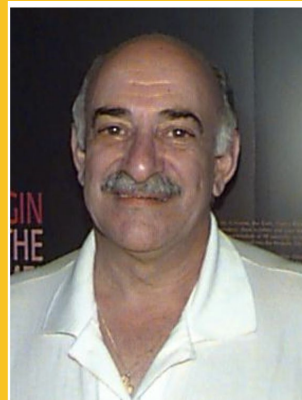


*Observatory electronics and maintenance personnel installing fiber optic cable for T1 internet and telephone service.*

Photo by Daniel Altschuler



Héctor Cruz (Photo by Tony Acevedo)



Greg Garcí. Photo by Tony Acevedo.

### *Jean-Luc Margot*

Jean-Luc Margot comes to the Planetary Radar Astronomy Group as a Post-Doc. He did his Ph.D. work at Cornell University under Don Cambell, and completed his thesis entitled "Lunar Topography from Earth-based Radar Interferometric Mapping." He successfully defended his thesis on Feb. 5, 1999. Soon after he moved here to Arecibo.



*Jean-Luc*



*Pedro Torres*

### *New Operations Technician*

**Pedro Torres**, our new Operations Technician has a Bachelors degree in Physics Applied to Electronics from the University of Puerto Rico, Humacao Campus. He has worked as a Communications Technician, Music Instructor, Observatory Technician, Electronics Technician, and has done research in Pentium and Pentium Pro Architecture.

1990s



*Francisco Nieves, second from left, joins the elite group of Arecibo Observatory Electronics Department retirees. Here he is joined by retirees (from left to right) Domingo Albino, (Frankie), José López, Roberto Rojas, and Miguel Feyjoo.*

Clockwise from  
top: Gene Lauria,  
Paul Goldsmith,  
Mike Davis





# 2011

## BIG CHANGE



# OBSERVATORIO DE ARECIBO: ORIGEN Y DESARROLLO

Por:

Carmen G. Segarra-Saavedra

Editado por Anaida Morales



**ADMIN: Mike Nolan, Carmen Segarra, Tony Acevedo, Lucy Lopez, Hector Hernandez, Don Campbell and Bob Buhrman**





**COMPUTERS:** Arun Venkataraman, Gomathi Shankaran, Giacomo Comes, Don Campbell and Bob Buhrman



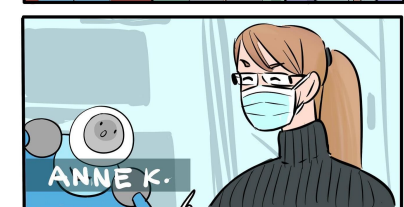
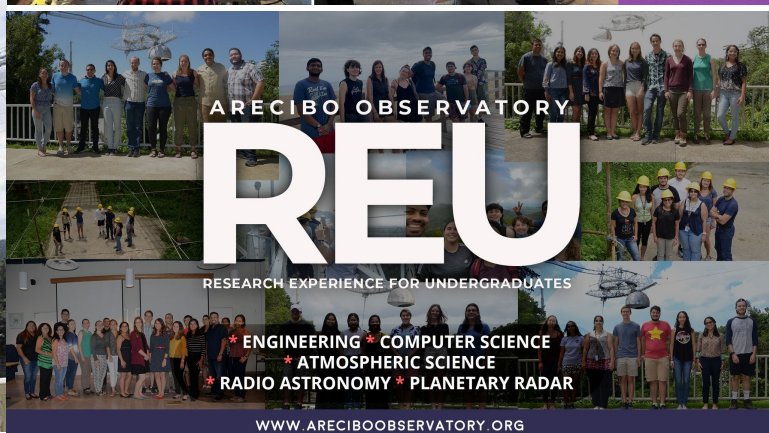
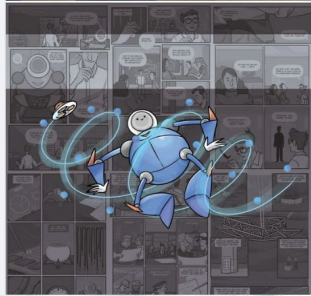
**ELECTRONICS:** Victor Iguina, Ganesh Rajagopalan, Luis Quintero, Sofía Cuevas, Denis Urbain, Dana Whitlow, Ernesto Ruiz, Wanda Santiago, José Rosa, Francisco Nieves, Phil Perillat, Juan Soto, Antonio Nolla, Jesús Ríos, José Vives, Don Campbell and Bob Buhrman.



**THE OPERATORS: Left to right: Angel Vazquez, Rey Velez, Raul Garcia, Israel Cabrera, Ernesto Ruiz, José Cruz, Elliot Gonzalez, Tony Acevedo, Willy Portalatin and Juan Marrero.**



**In all...**

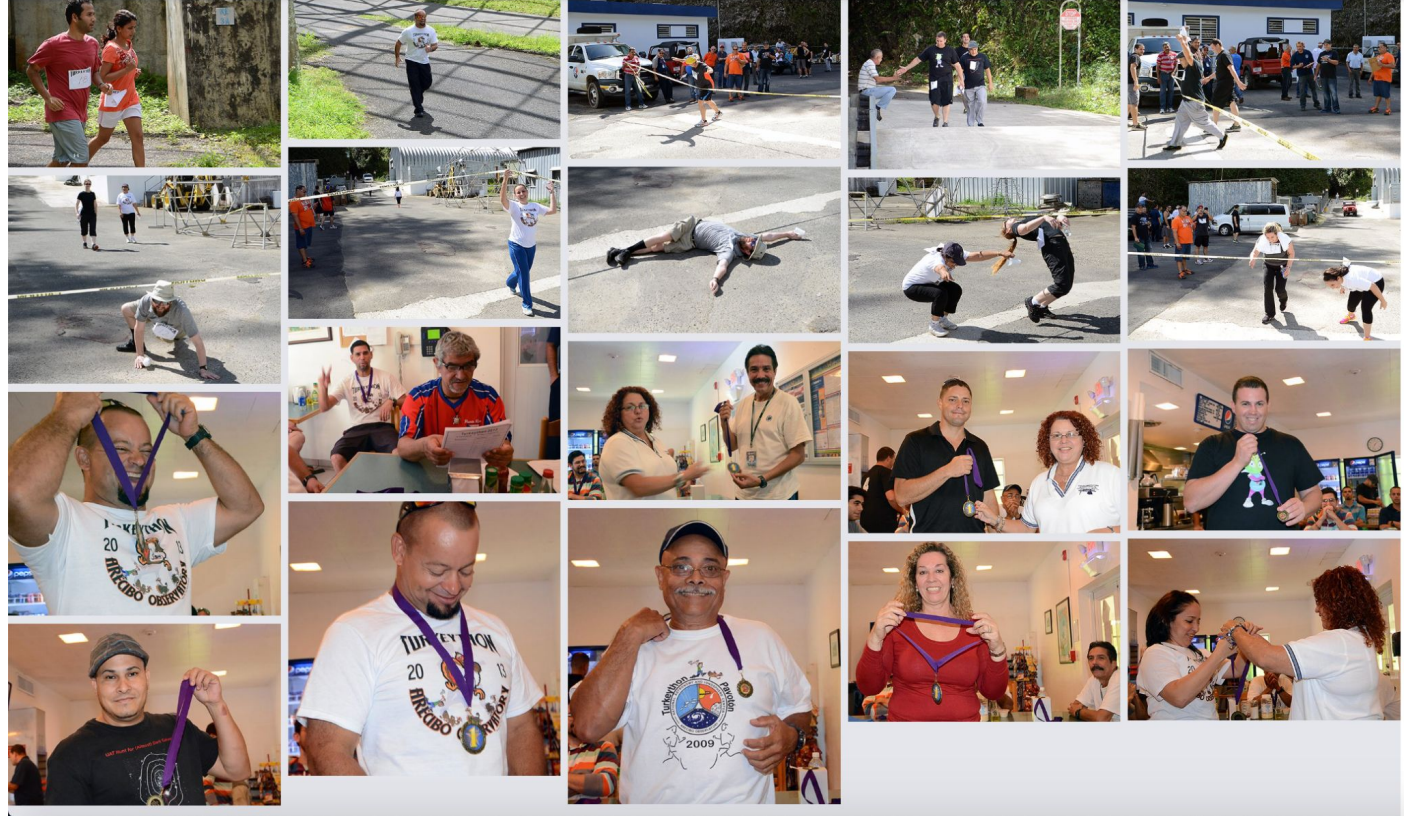


Arcibo Science Advocacy Partnership, Lunch Meeting, July 2 2024



*Arecibo Science Advocacy Partnership, Lunch Meeting, July 2 2024*

# Turkeyton





UNIVERSITY OF CENTRAL FLORIDA



Arecibo Science Advocacy Partnership, Lunc

ARECIBO OBSERVATORY

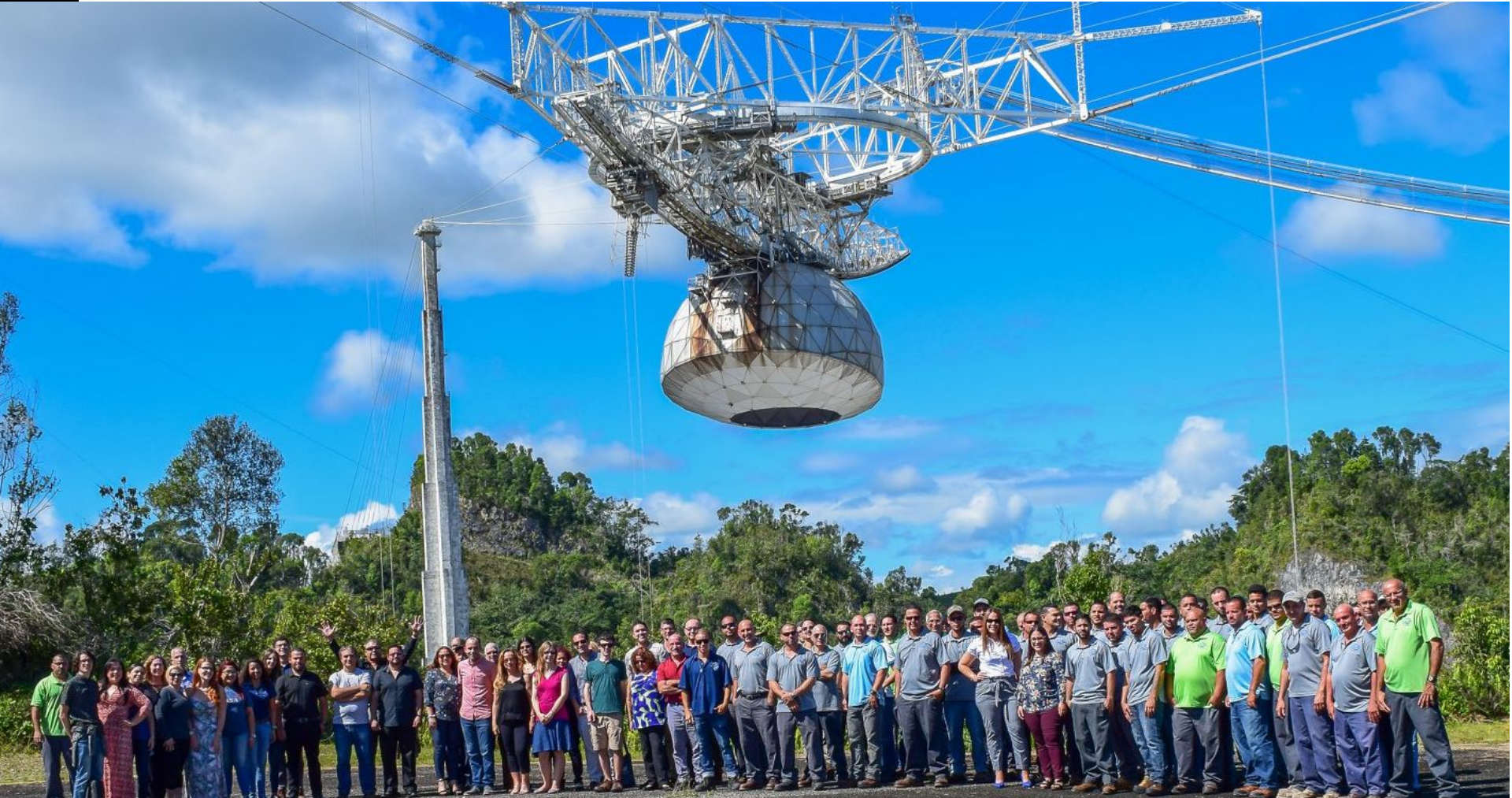
**THE BIGGEST DREAM**

UNIVERSIDAD ANA C. MENDEZ PRESENTA  
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 DIRECTOR DE FOTOGRAFIA DIEGUE CRUZ MONTAJE BEN THATCHER ASISTENTE DE PRODUCTORES EMANUEL LOPEZ & XIMARARA A. CRUZ EX. FOTOGRAFIA B. FILMS INC.  
 PRODUCTORA EJECUTIVA RICARDO REY CORREA - DIEGA A. FISHEROLA - ADRIEL MACHIN DE JESUS - WILLIAM O. GONZALEZ-SIERRA \*\*\* ANGEL G. NIEVES & KEYSHINA SOSA  
 PARA UNA ARECIBO EVAN A. MORENO DE ARECIBO DIRECTOR KENNETH SOTO MONTAJE GABRIEL ESPINOSA ALEX W. RAMOS RODRIGUEZ DE ARECIBO MONTAJE ADRIEL SORIANO G. MANUEL NIETO VAZQUEZ  
 DIRECTORA GENERAL CARIBBEAN FILM ORQUESTA PRODUCTORA JAIME A. ROVERA GONZALEZ COORDINADOR JOEL A. ROSARIO GONZALEZ  
 WWW.ARECIBOBSERVATORY.ORG



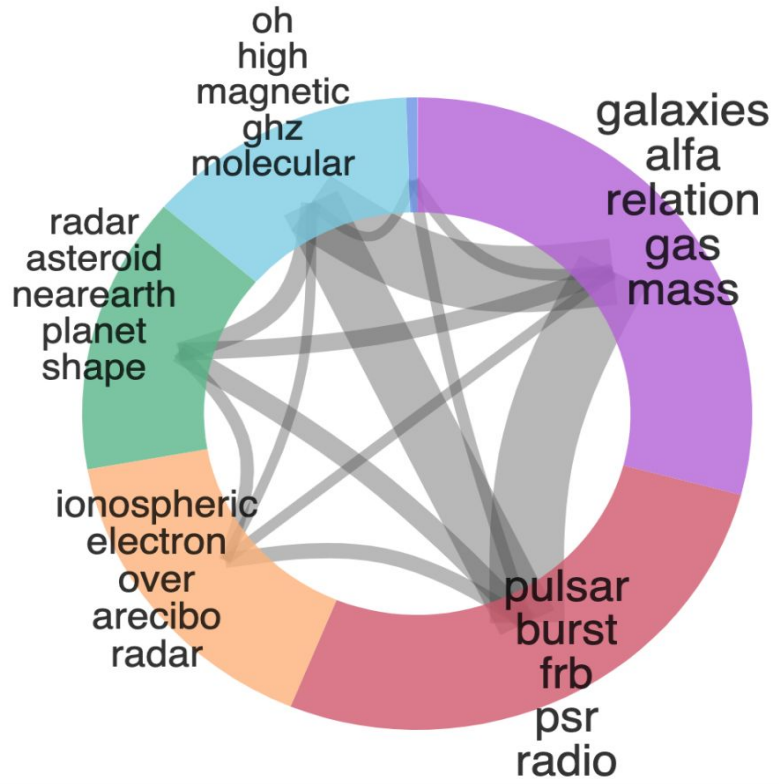




**The Afecibo Observatory Team.**

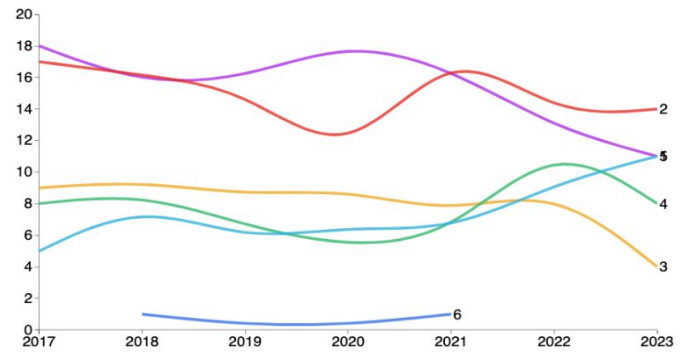
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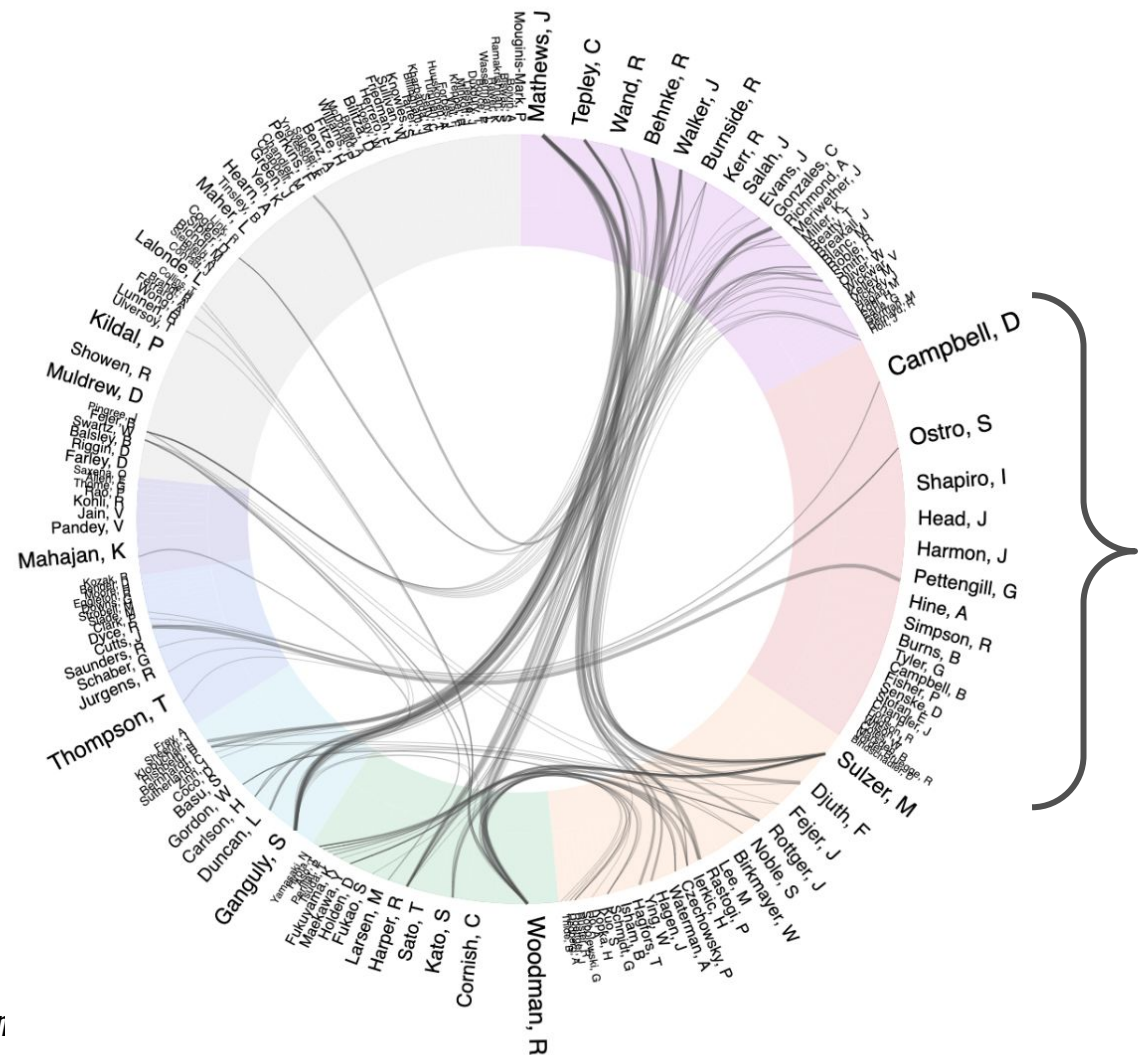
## NASA ADS



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# END

