



# Carlos R. Ordóñez

Professor  
Department of Physics  
University of Houston

XIX Congreso Nacional de Ciencia y Tecnología  
**APANAC 2023**





# 2023 Edward A. Bouchet Award Recipient

**Carlos R. Ordóñez**  
**University of Houston**

**Citation:**

*"For outstanding and impactful seminal research in different areas of physics and, in parallel, for being a dedicated advocate for advancement in physics in Latin America and in the Hispanic Community in the USA."*







**“Caminante, no hay camino, se hace el camino al andar...”  
(Antonio Machado, Spanish poet), or the brief tale of my  
parallel physics and advocacy paths**

**Carlos R. Ordóñez**





Honoring the memory of Prof. Edward A. Bouchet



It all started here!





# U of Panama



- B. Fernández
- L. Calvo
- C. Garrido
- N. Sánchez
- S. Guerra
- J. Vincenzini
- R. Rosas

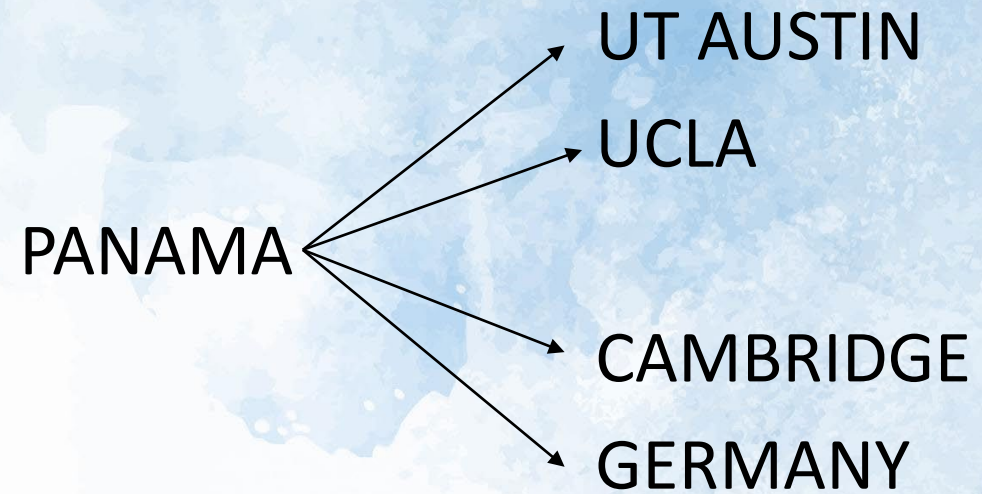


At Panama's Airport (June 1<sup>st</sup>, 1980)





## Machado's Principle in action: beginning of Path





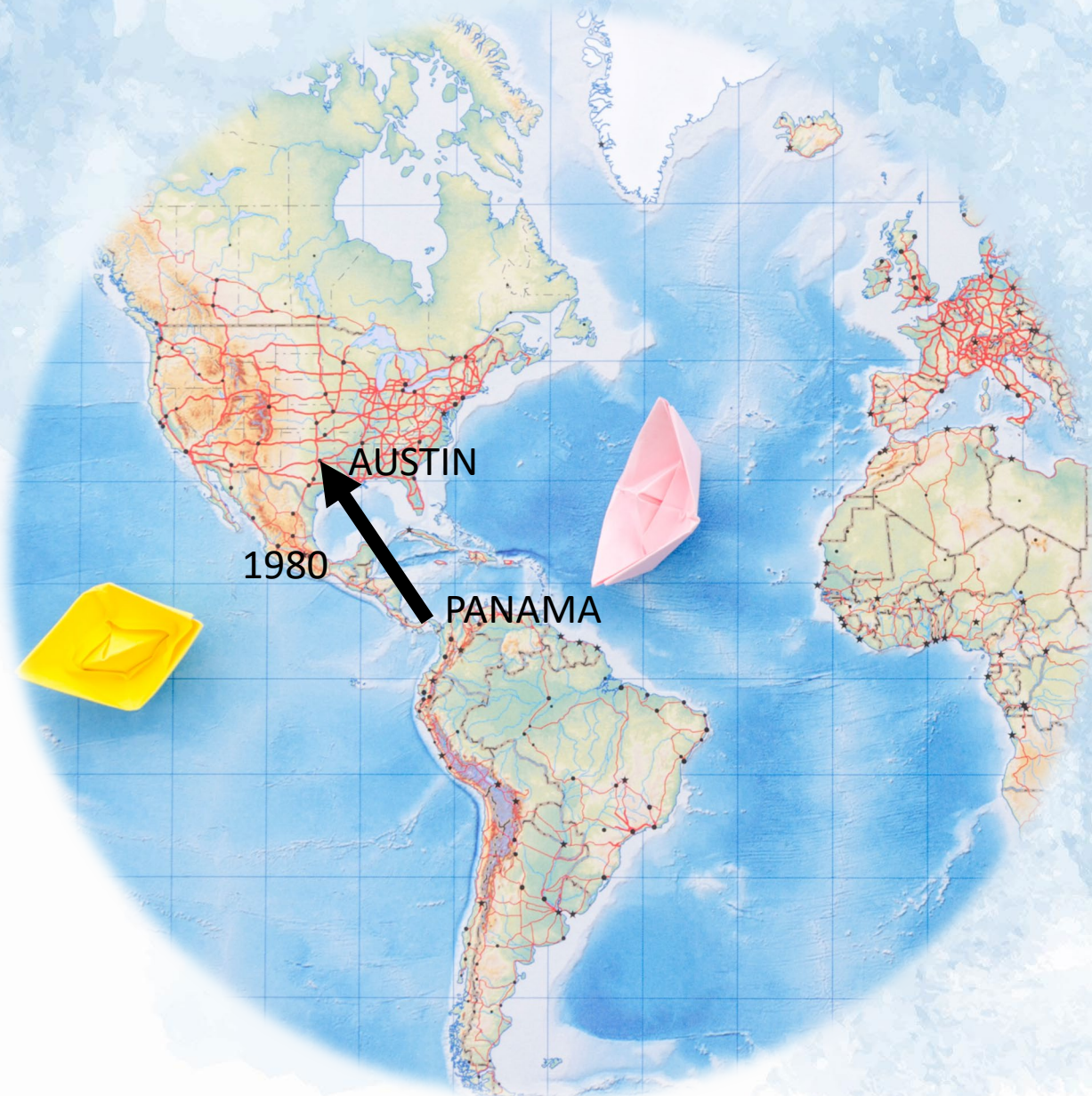
# UT Austin: Final Choice!

Key mentor: Robert (Bob) Little



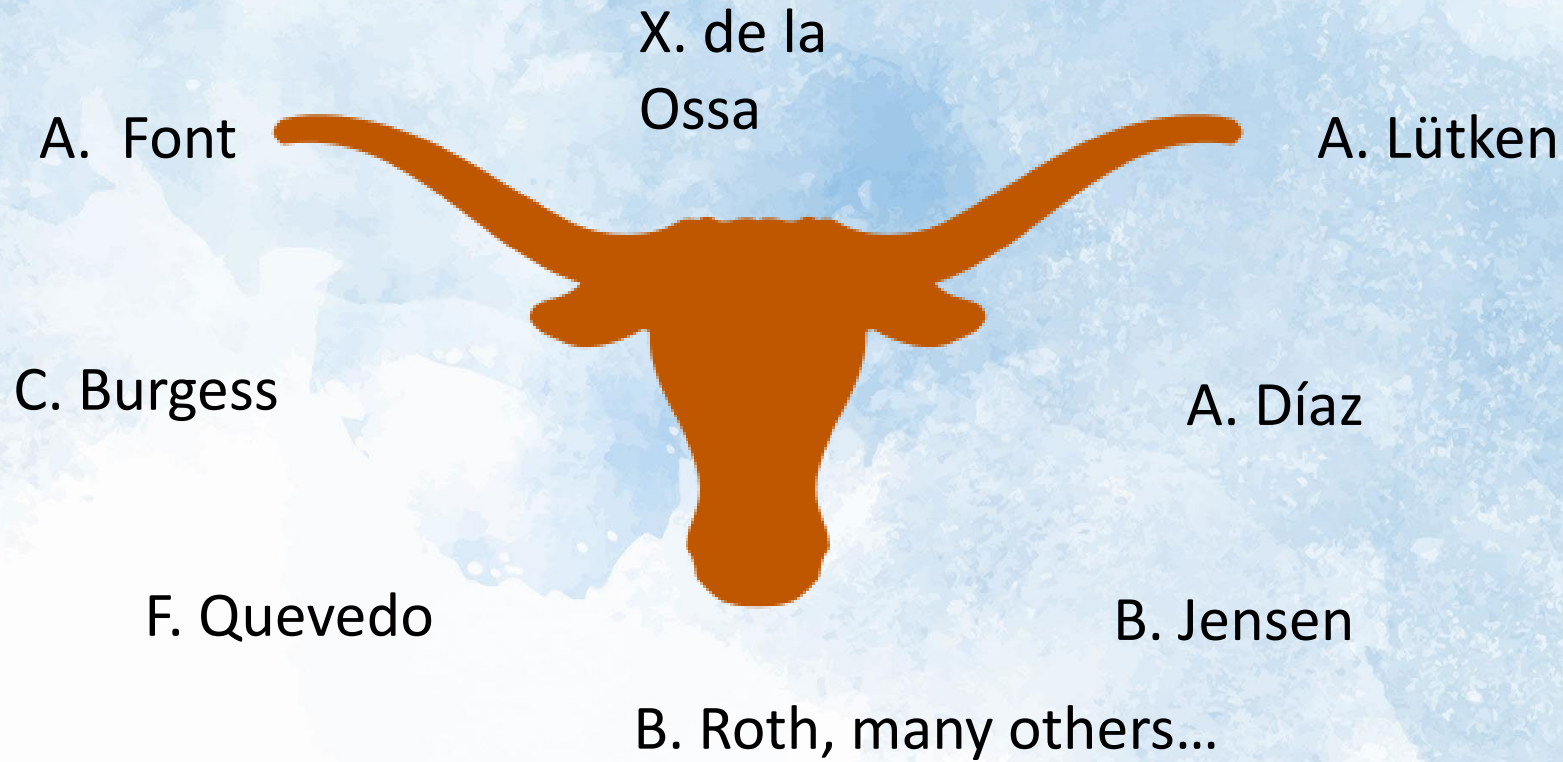
Met in Panama in early 1980. I was in Austin in June!





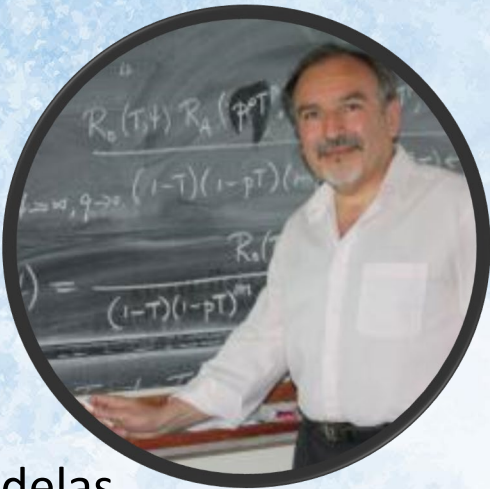


# UT Student Years (Friends)





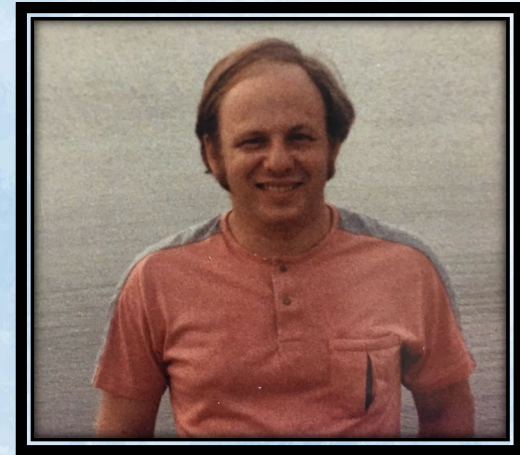
# Professors, Mentors



P. Candelas



C & B DeWitt



M. Rubin



J. Polchinski



W. Fischer



A. Gleeson



All great but the key one is:



**Steven Weinberg**





# Steven Weinberg

## Accomplishments and Awards:

- Renowned for research on elementary particles and cosmology.
- Honored with several prestigious prizes and awards, including the **Nobel Prize** in Physics (1979; for the theory of unification of weak and electromagnetic interactions), and the National Medal of Science (1991).
- Received the Benjamin Franklin Medal of the American Philosophical Society in 2004, earning recognition as one of the world's foremost theoretical physicists.
- Elected to prominent scientific societies, including the US National Academy of Sciences, Britain's Royal Society, the American Philosophical Society, and the American Academy of Arts and Sciences.

## Scholarly Contributions:

- Author of over 300 articles on elementary particle physics and cosmology.
- Notable books include "Gravitation and Cosmology," "The First Three Minutes," and "Dreams of a Final Theory."

## Career and Education:

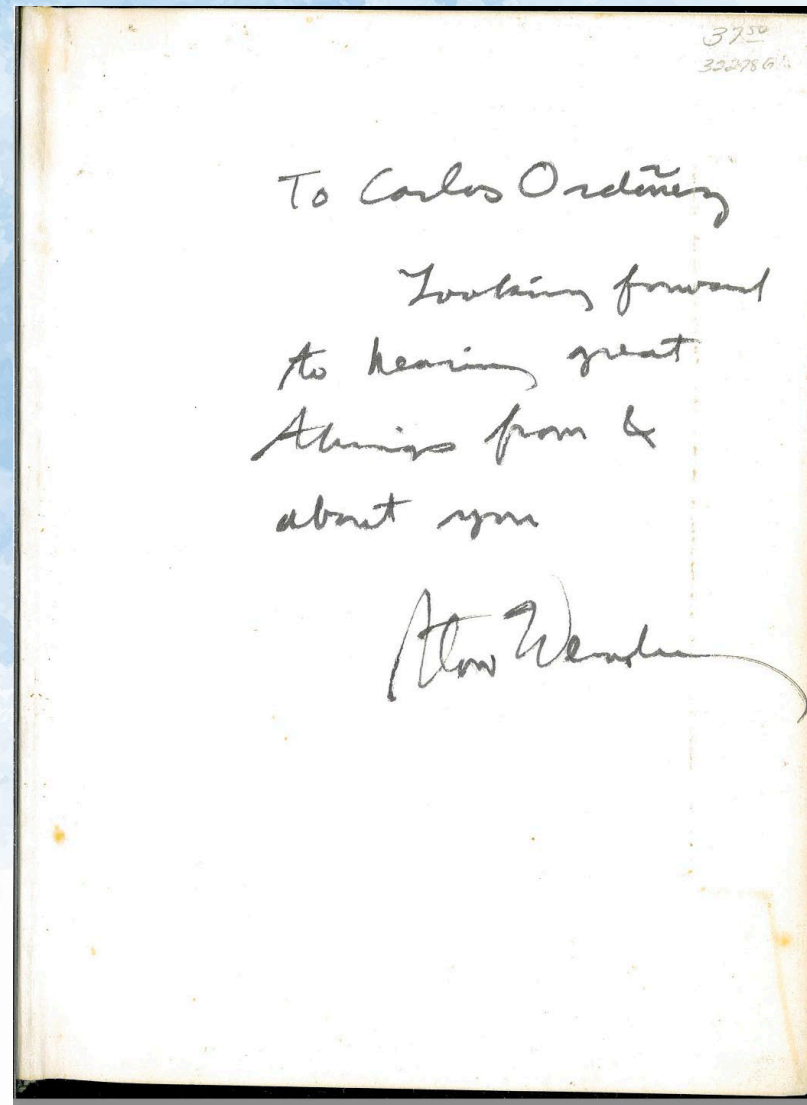
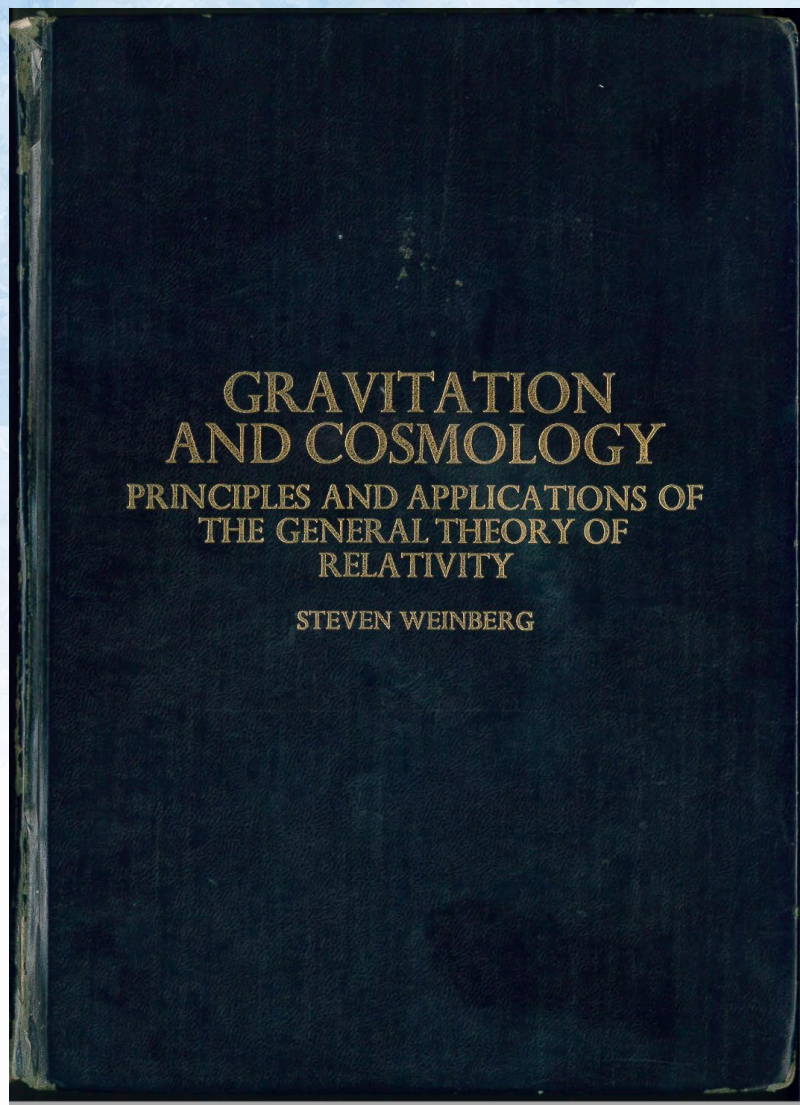
- Taught at renowned universities such as Columbia, Berkeley, M.I.T., Harvard, and the University of Texas at Austin.
- Holds honorary doctoral degrees from sixteen universities, including Chicago, Columbia, and Yale.

## Service and Engagements:

- Served as a consultant at the U.S. Arms Control and Disarmament Agency.
- President of the Philosophical Society of Texas.
- Member of various boards and committees, including the Library of Congress and the JASON group of defense consultants.



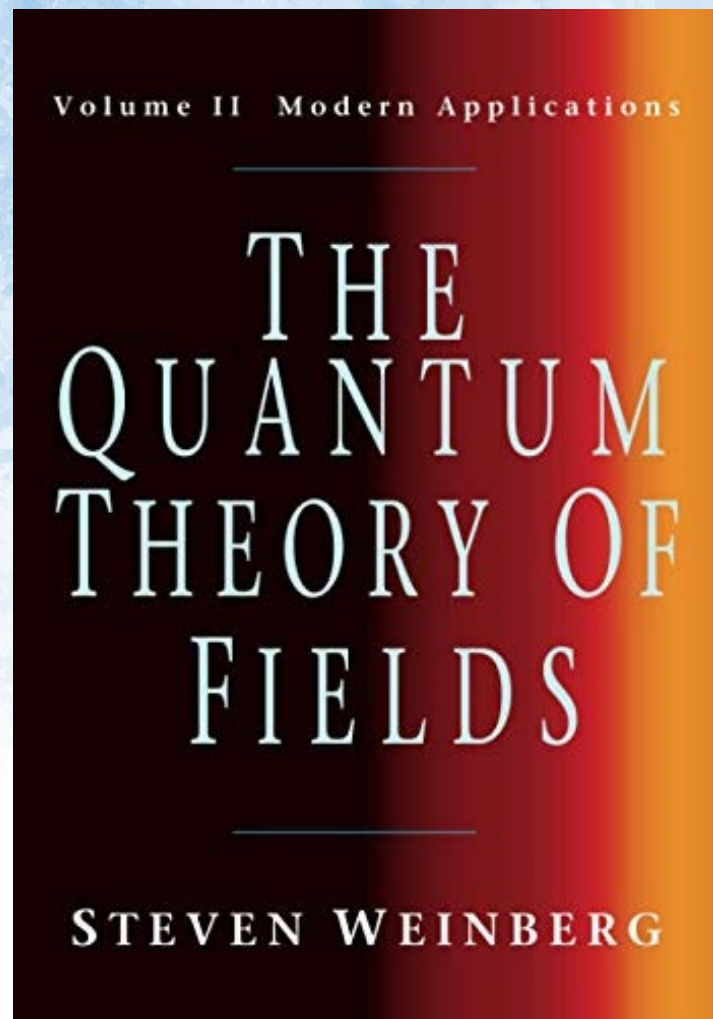
# Steven Weinberg







# Steven Weinberg



29. S. Weinberg, *Phys. Lett.* **B251**, 288 (1990); *Nucl. Phys.* **B363**, 3 (1991); *Phys. Lett.* **B295**, 114 (1992). C. Ordóñez and U. van Kolck, *Phys. Lett.* **B291**, 459 (1992); C. Ordóñez, L. Ray, and U. van Kolck, *Phys. Rev. Lett.* **72**, 1982 (1994); U. van Kolck, *Phys. Rev.*, **C49**, 2932 (1994); U. van Kolck, J. Friar, and T. Goldman, to appear in *Phys. Lett. B*. This approach to nuclear forces is summarized in C. Ordóñez, L. Ray, and U. van Kolck, nucl-th/9511380, submitted to *Phys. Rev. C*; J. Friar, *Few-Body Systems Suppl.* **99**, 1 (1996). For application of these techniques to related nuclear processes, see T.-S. Park, D.-P. Min, and M. Rho, *Phys. Rep.* **233**, 341 (1993); nucl-th/9505017; S. R. Beane, C. Y. Lee, and U. van Kolck, *Phys. Rev.*, **C52**, 2915 (1995); T. Cohen, J. Friar, G. Miller, and U. van Kolck, nucl-th/9512036; D. B. Kaplan, M. Savage, and M. Wise, nucl-th/9605002.

O'Raifeartaigh, L. 78  
Oakes, R. J. 250  
Oehme, R. 248  
Ojima, I. 60, 61  
Okubo, S. 231, 250, 251  
Okun', L. 356, 474, 475  
Oleson, P. 474  
Ordóñez, C. 249



# Parallel tracks, UT student years



RESEARCH/EDUCATION (1980-1986)

ADVOCACY



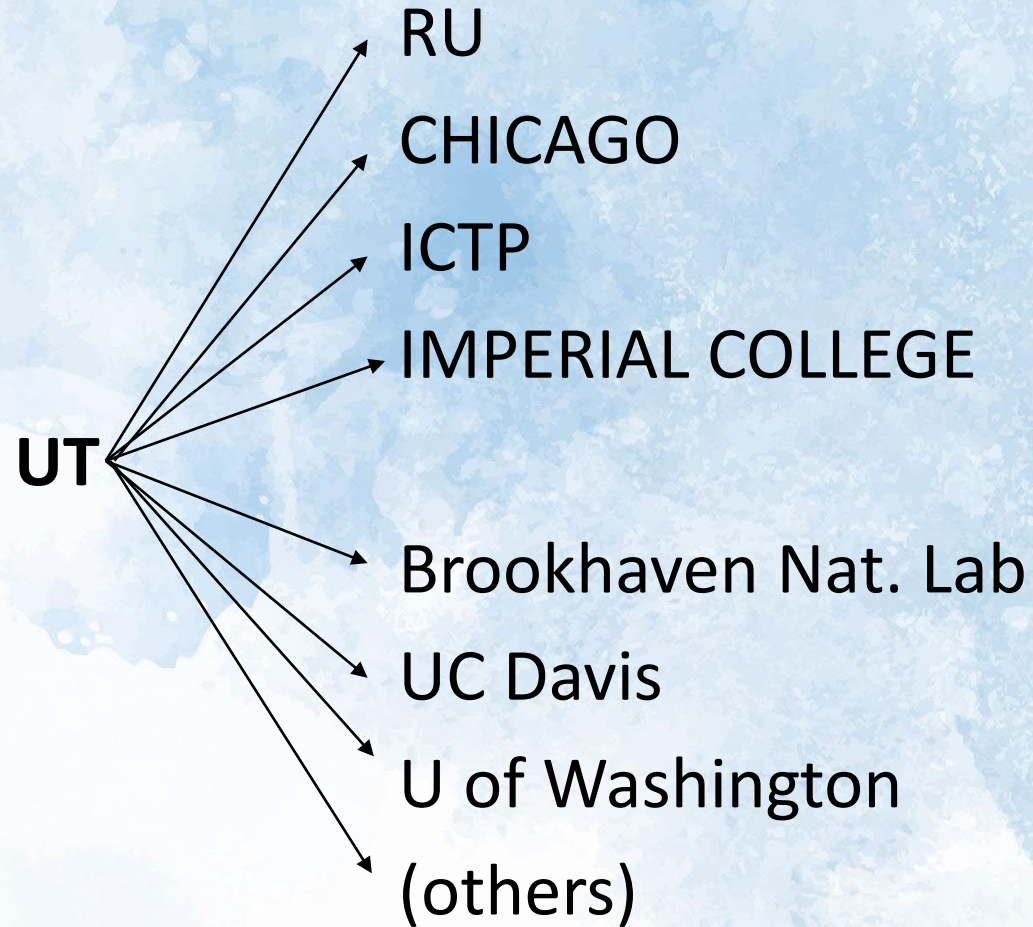
K-K Quantum Compactification  
In 11D SUGRA (Candelas)

In gestation...

Collaborators: Mark Rubin  
A. Lütken



Got pretty lucky and had many postdoctoral offers! (~13)

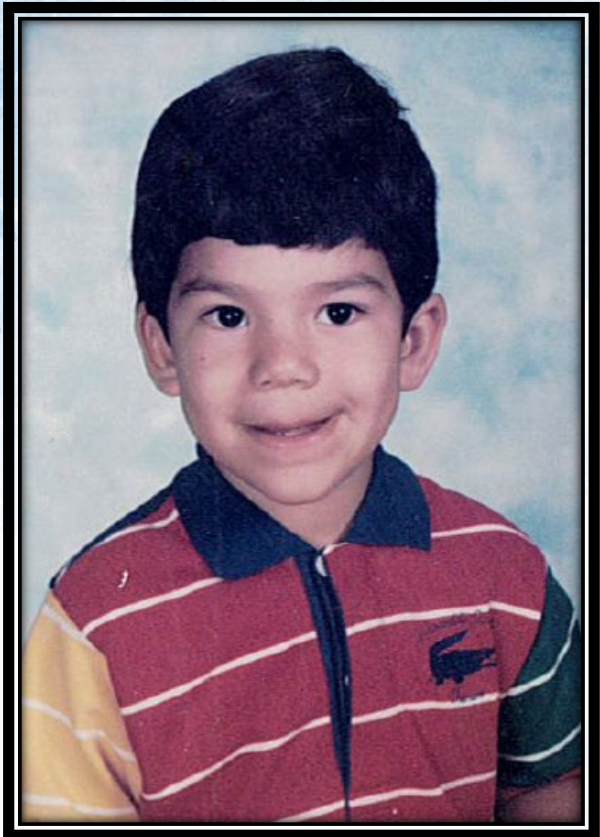






# Major Family Event: First Son Luis Carlos

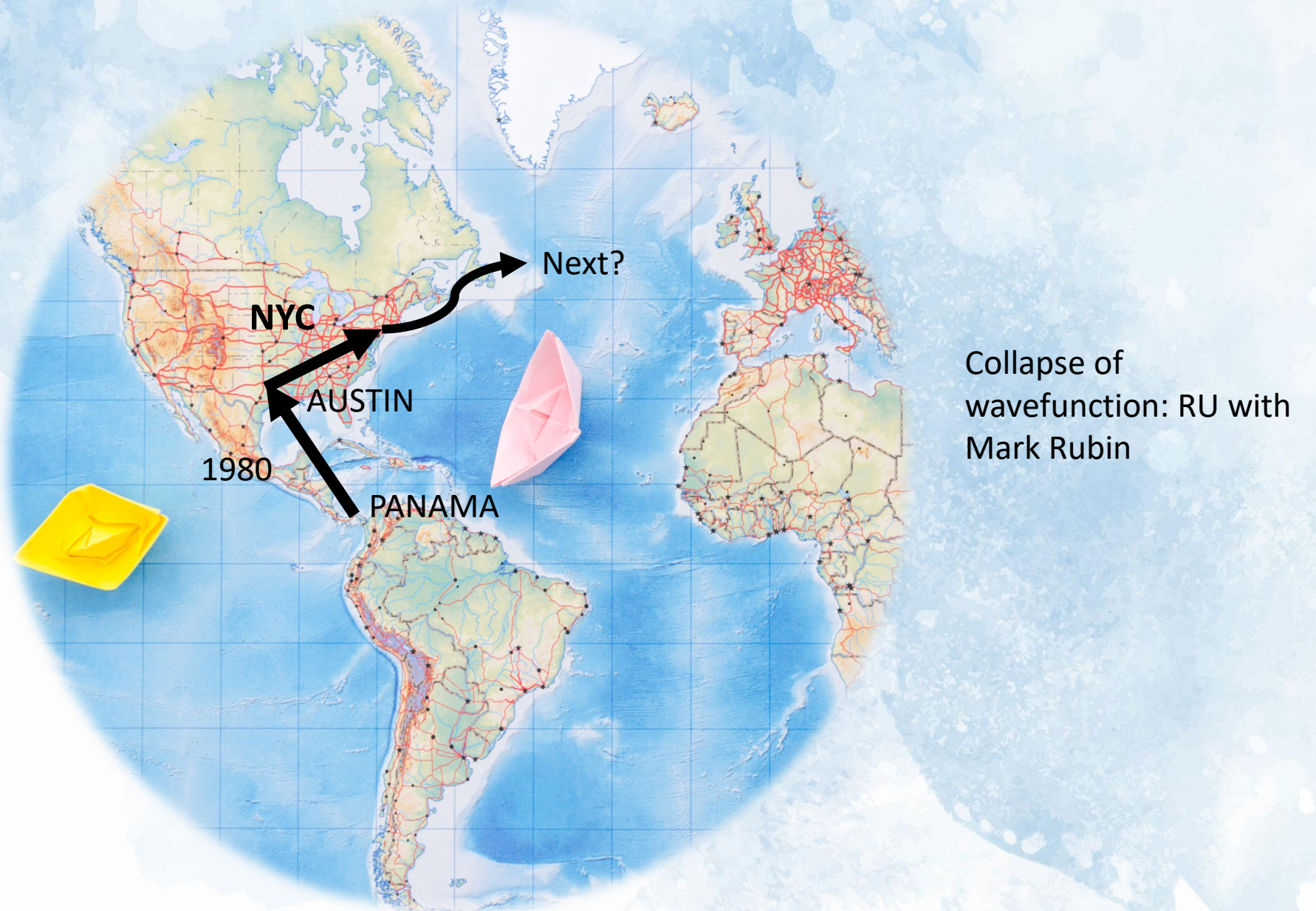
Born in Austin, Jan 22nd, 1986.



**Flew directly from Brookhaven!**



# Machado's Principle







# THE ROCKEFELLER UNIVERSITY

*Science for the benefit of humanity*



**t**  
↓

## RESEARCH/TEACHING (1986-1989)

- Off-shell aspects of bosonic string theory

Collaborators:

M. Rubin

S. Das

R. Zucchini

D. Zwanziger

S. J. Rey

NYU (A. Sirlin: great scientist, mentor, friend)

Teaching QFT (1987,1988) invited by Sirlin: great students and lots of fun! Teaching on Broadway

- Visited CERN (Quevedo)
- Aspen, Brookhaven National Lab

## LATIN-AMERICAN/HISPANIC ADVOCACY

- Interacted with group of top Latin-American students at NYU, from Argentina and Brazil
- **Horacio Camblong** (long-term collaborator) and others
- Thoughts about creating links with LA started





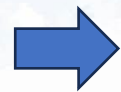
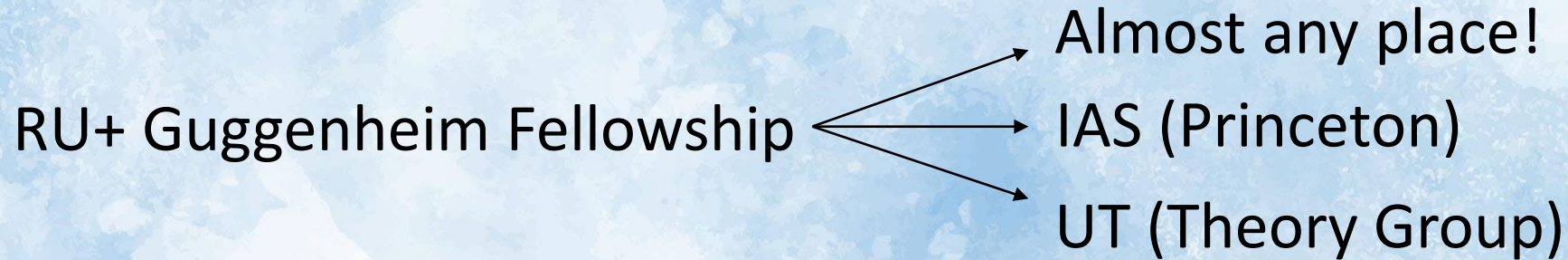


This work plus letters from Candelas, Polchinski, Rubin and Weinberg helped me earn a

**Guggenheim Fellowship (Latin-American competition)**



Working hard, being at the right place, right time + AMAZING MENTORS leads to applying Machado's principle again



1989-1990:

UT (academic year)

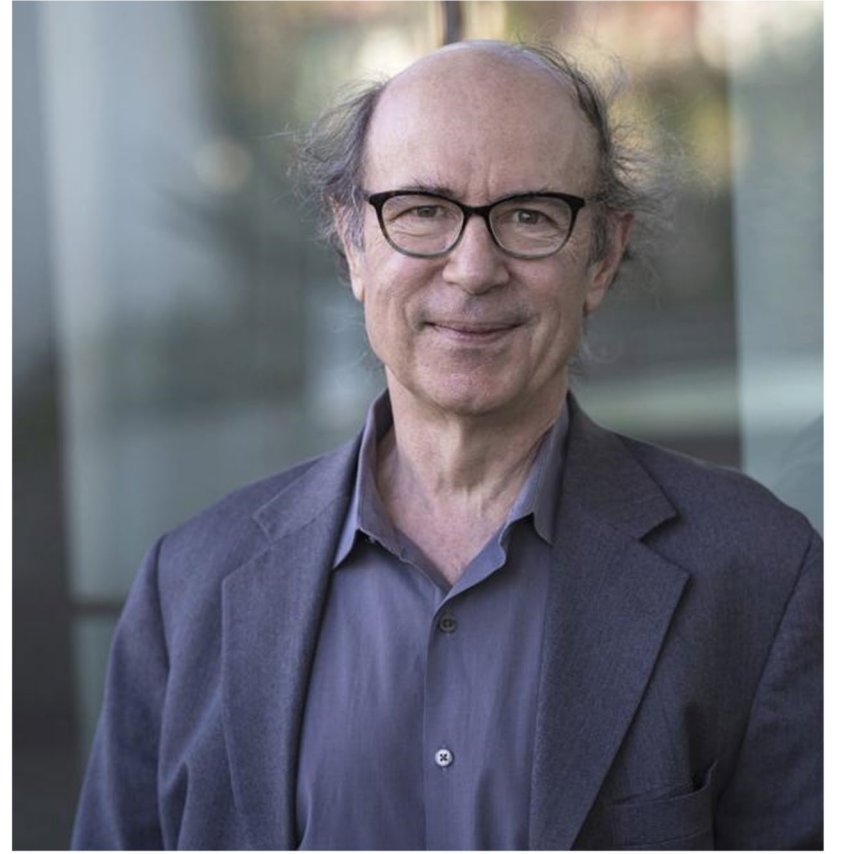
IAS (summer, F. Wilczek host)



IAS (Princeton)



F. Wilczek





# Machado's Principle





UT second sojourn: Research Associate + Lecturer,  
Guggenheim Fellow, World Lab Fellowship (1990-1994)

A. Zichichi





## PARALLEL TRACKS

t  
↓

### RESEARCH

- QFT
- Chiral Lagrangian Effective Field Theory  
Approach to Nuclear Physics

3 papers almost 2000 citations

(L. Rey, **B. van Kolck** )

Got me a permanent job!

### ADVOCACY

- Pan-American Association for Physics (1993-2000)
- Founded National Society of Hispanic Physicists (Austin, 1995)

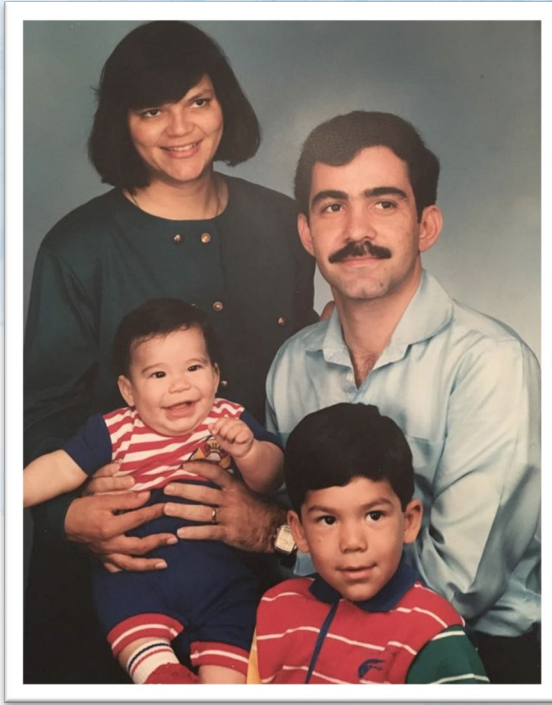






# Personal

Happiest moment: Second son (José Miguel), born in Austin, Sep. 10th, 1990.



Saddest moment: Big brother passing (1995)



Then.. off to Nashville!







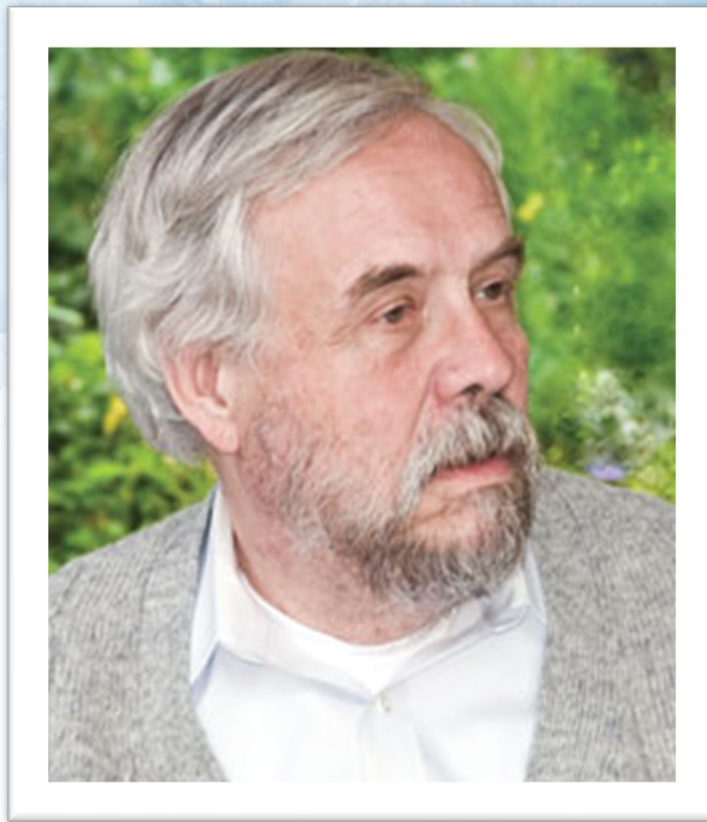
# Vanderbilt year (1996-1997)







David Ernst: great mentor, friend, colleague







- Teaching “Cowboy Physics”
- Strategizing with DE about Pan-American & Hispanic projects
- Then... **BREAKTROUGH:**

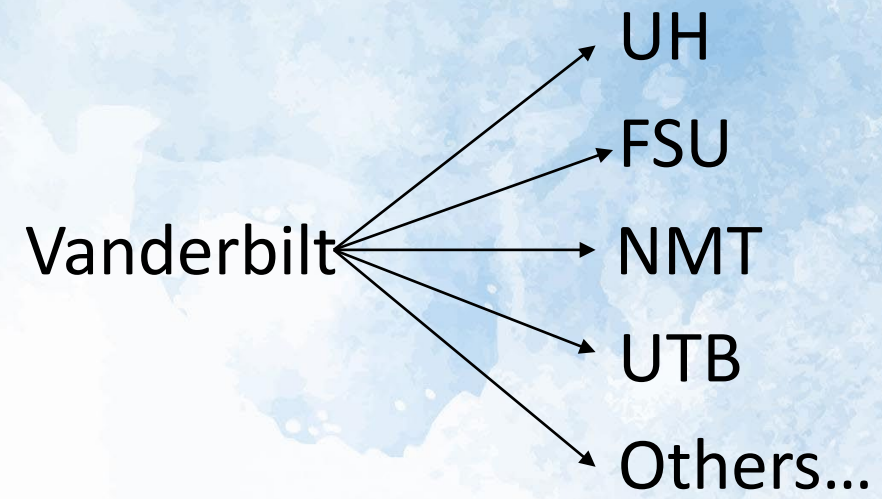




Zichichi offers to fund a postdoctoral program at an American research university (with me as director) (World Lab fellows), if I can form a prestigious scientific advisory board with Deans (and the like)...

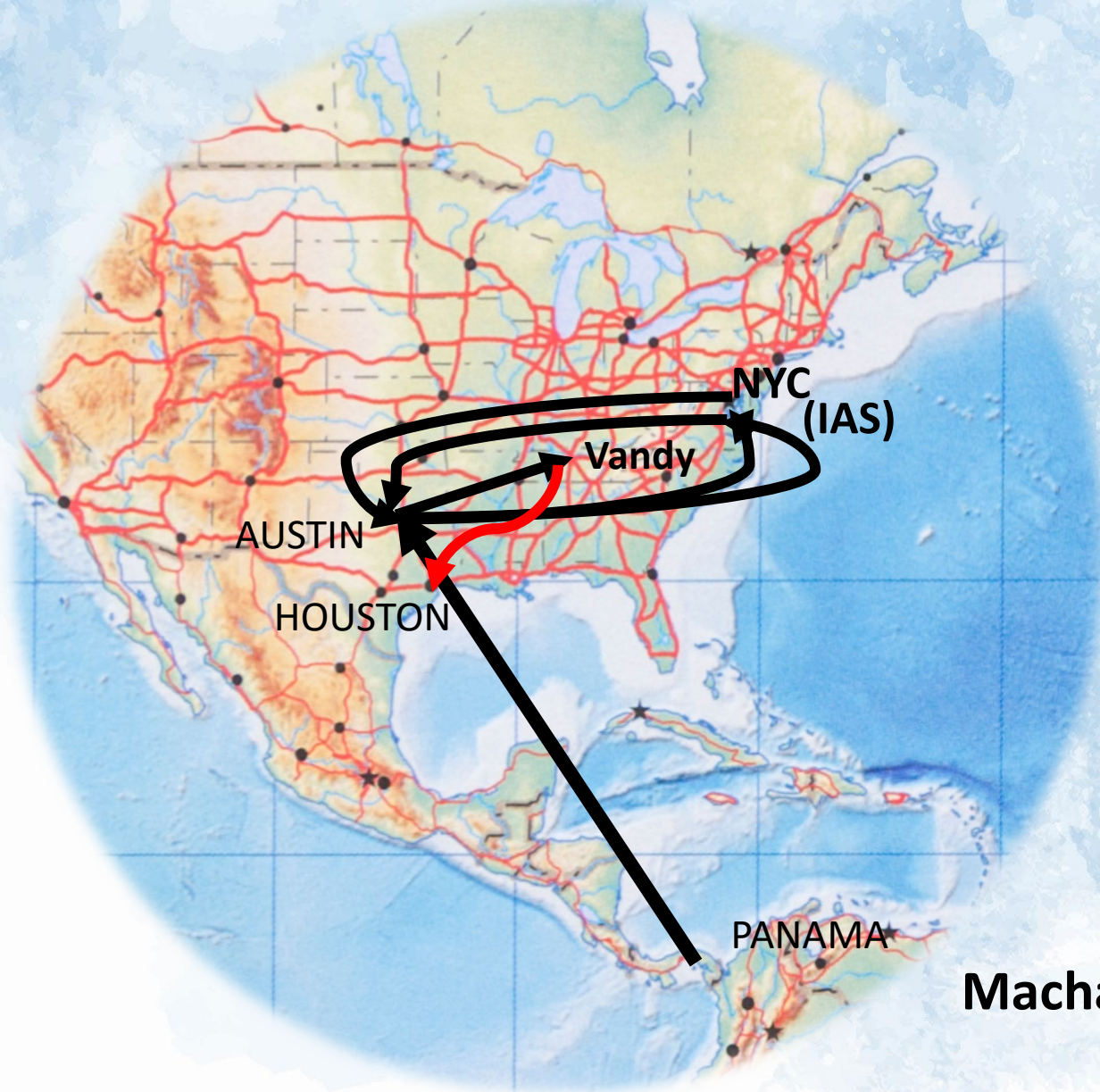


## Machado's Principle again



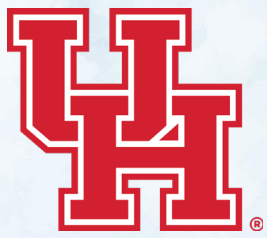


And, back to Texas



**Machado's Path! (until now?)**





## PARALLEL TRACKS (1987-2023)

### RESEARCH



- Anomalies in Conformal Q. Mechanics (CQM)
- Black hole Thermodynamics using CQM/near horizon framework
- Applications of anomalies in CQM to 1D, 2D Fermi gases
- KAVLI SCHOLAR (2006-2008)
- Jefferson Lab (JLAB) Fellow (Summer 1999)
- Work in Intersection of Quantum Information/ Quantum gravity/AMO

(Funded by: NSF, Texas, AFOSR, ARO, WL)

### ADVOCACY

- Center for the Americas
- World Lab Center
- Work with ICTP in Central America
- UH-ICTP Program
- Close connections with Monterrey Tech (ITESM, Monterrey, Mexico)

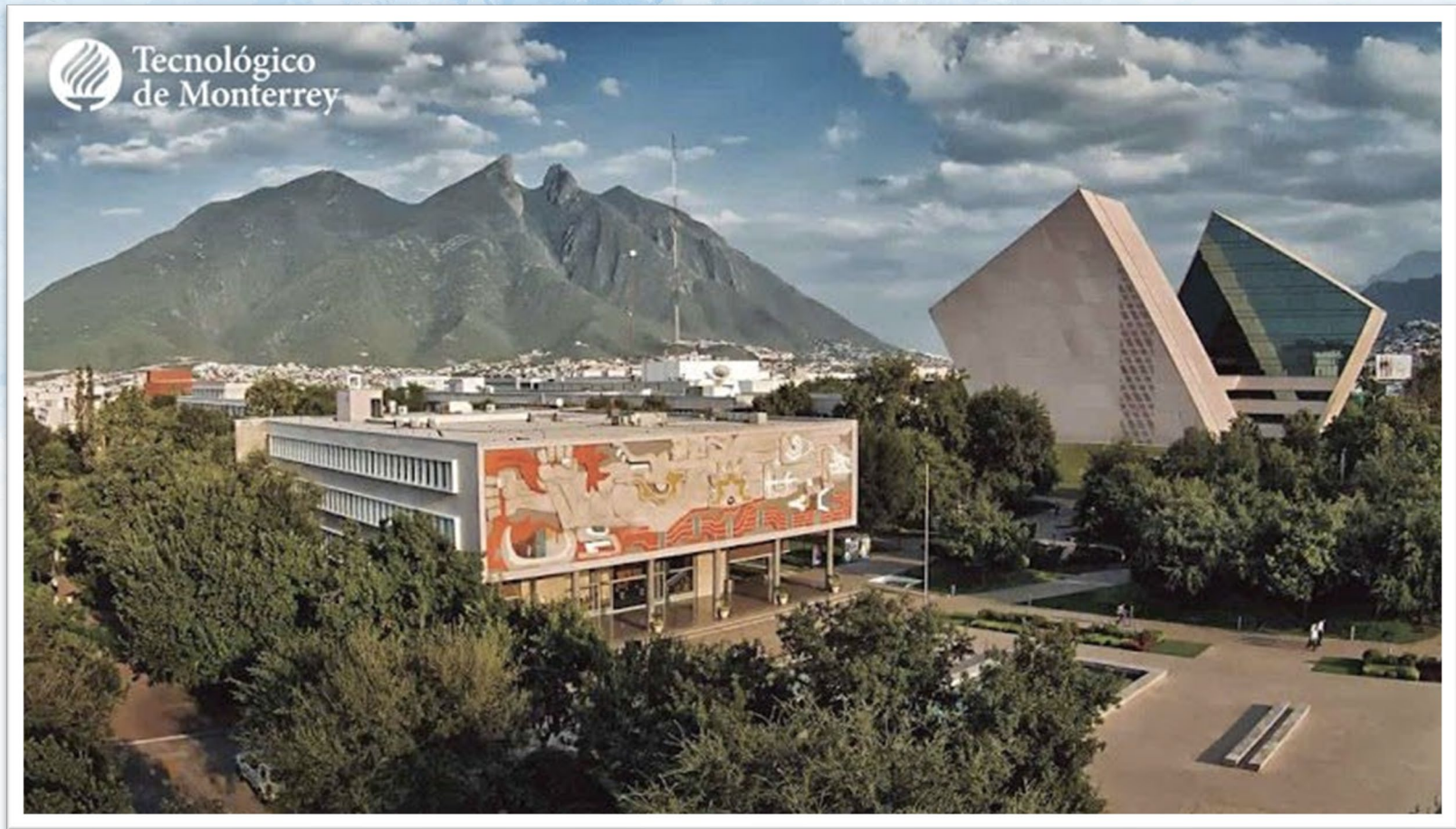


## Academic authorities/researchers

- A. Bustani (former Rector)
- D. Garza (current Chancellor)
- J. Gutierrez (photonics and quantum sciences)

## Industry friends

- M. M. Brittingham
- T. Milmo Santos
- A. Garza Santos





This work (Research/Teaching +  
Advocacy) led to some recognition...



# By APS

- Elected Fellow (2009)
- John Weathley Award (2009)
- Edward A. Bouchet Award (2023)

## **THANKS!**

Also a special medal...



From Pope John Paul II at the Vatican for  
work with World Lab (1999)!





# Key people in Houston

## A) People who brought me here

L. Pinsky (chair)

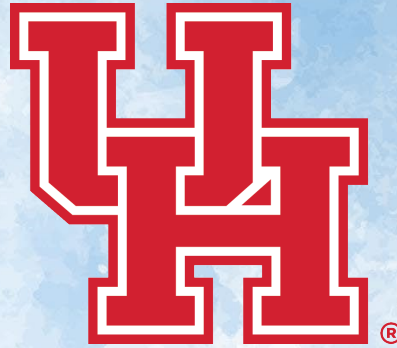
L. Zamora (Dean, CLASS)

R. Cortina (CLASS)

A. Warner (Dean, Ed.)

G. Reiter (physics)

J. Bear (Dean, NSM)





# Key people in Houston

B) Key Mentors over the years (Especially World Lab years)



A. Ignatiev  
P. Chu

M. Pettitt  
A. Weglein

## **Recently**

K. Bassler (Chair)  
D. Wells (Dean NSM)

G. Gunaratne (Former Chair)

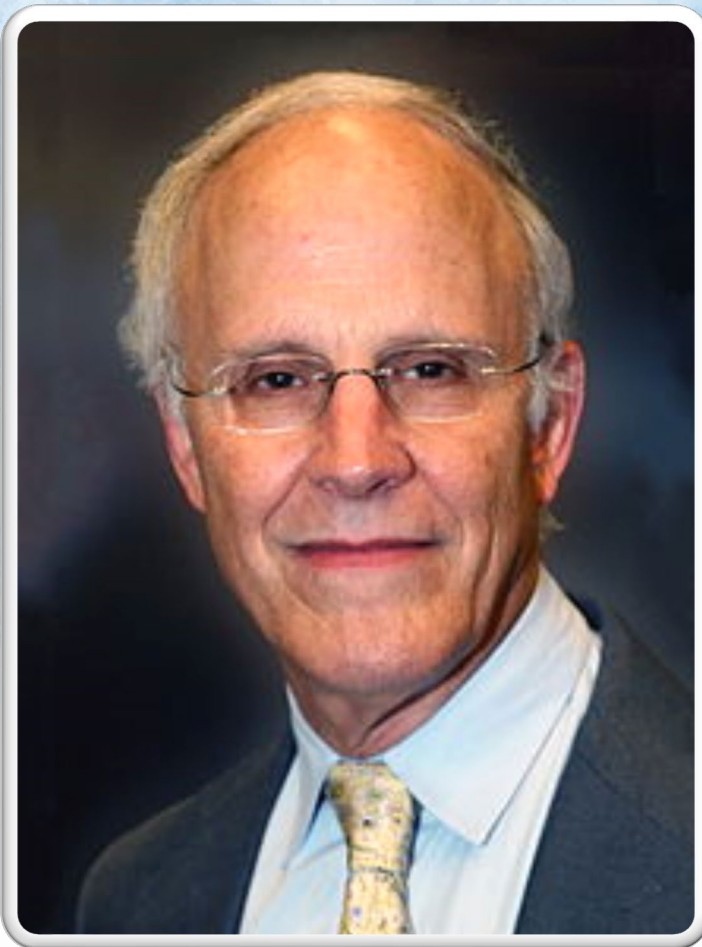


**N. Lane**

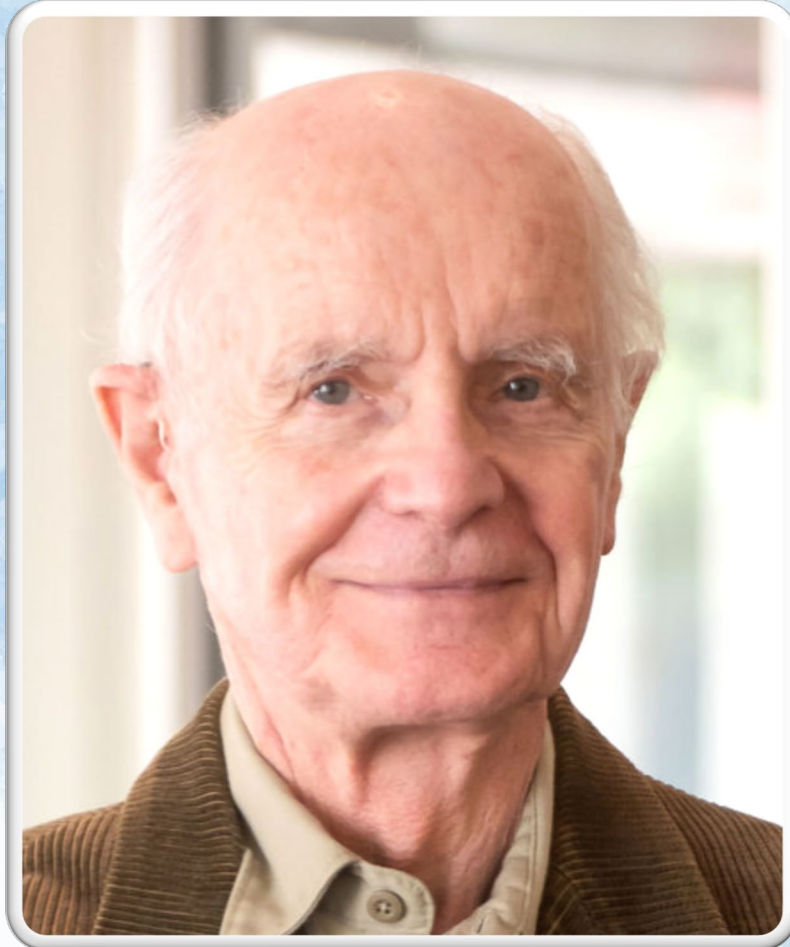
R. Curl



# Outside of Houston



D. Gross (KITP, UCSB)



M. Scully (Texas A&M, IQSE)



# Current Interests

- Research: Nonrelativistic and Relativistic Quantum Information  
(recent ARO grant, 2023-2027)
- Advocacy/educational
  1. Learn about Marlan Scully's Quantum Bootcamp and try to replicate it in other US locations and in Latin America
  2. Pan-American Quantum Consortium



**[CONFIDENTIAL]**

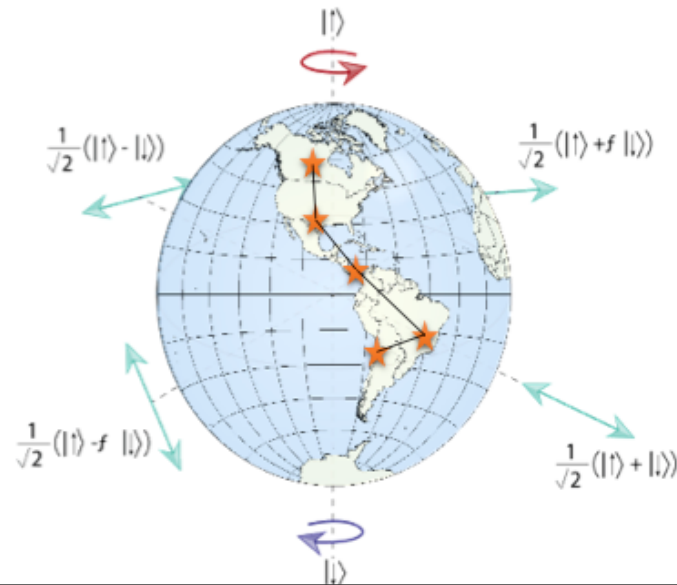
**PAN-AMERICAN QUANTUM CONSORTIUM (PQC)**

Prepared and proposed by Dr. Carlos R. Ordonez

June, 2023

**SUMMARY**

I propose to create a consortium of universities, research centers and industrial and government partners in the Americas that will promote the integration and development of quantum science and technology throughout the Western Hemisphere. Initial members, proposed activities and potential funding sources are presented.





# Lessons Learned

- Mentors and supporters have played an essential role in my professional and personal development over the years
- It is very important for all of us to mentor younger scientists
- It is critical to develop and maintain a high-level research profile while developing advocacy (balanced approach)
- *Machado was right: I had no idea 43 years ago that I was going to be taking such a winding and fascinating path to be here today!*



The background of the slide is a soft, abstract watercolor wash in various shades of blue, ranging from light sky blue to deeper cerulean and indigo tones. The texture is painterly and organic, with soft edges and subtle variations in color intensity.

**SPECIAL THANKS**

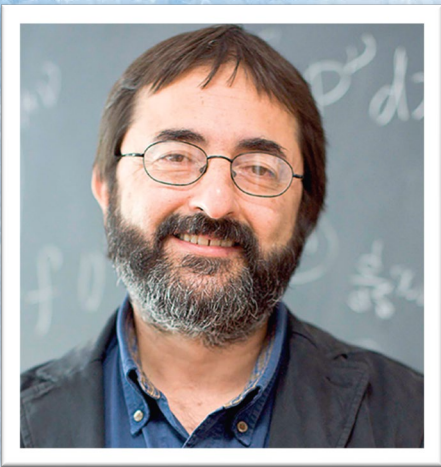


NOMINATOR: J. LÓPEZ





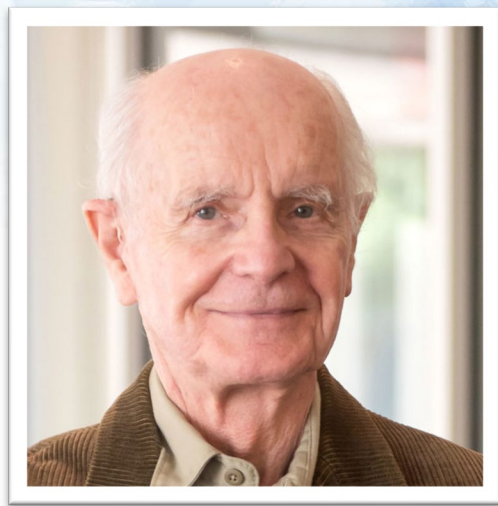
# LETTERS OF SUPPORT



F. Quevedo



N. Lane



M. Scully



M. Yacamán



# Special Thanks and acknowledgement

- To my former student, Dr. Wilder Daza, with technical help in the preparation of this presentation. He is a physics professor in his native Colombia at the Pedagogical and Technological University of Colombia. Gracias Wilder, I'm very proud of you!
- The use of graphic resources for this presentation from freepics and other free sites.




# Special Thanks and acknowledgement

To my extended family in Panama and my immediate family in the US: their love and continued support has provided me with the energy, enthusiasm and inspiration that has allowed me to always continue forward in creating my own professional and personal path: I love you all!!



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A large, solid red heart with a thin black outline is positioned in the center of the text, partially overlapping the words "and" and "enthusiasm".



# Surprise!!

- Feynman
- Ordóñez



**THANKS TO ALL OF YOU FOR YOUR ATTENTION!**