

ISVHECRI<sup>20</sup>  
Puerto Vallarta, México 8 -12 July 24

Registration  
Open  
(Hybrid)

The International Symposium on  
Very High Energy Cosmic Ray Interactions



MEMBER OF EL COLEGIO  
NACIONAL IN MEXICO

IN HONOR OF (on July 12, 2024)  
(see website for more information)

**Manuel Sandoval Vallarta**

For his contributions to cosmic  
ray physics on the occasion of  
his 125th birthday.

Developer of the  
Lemaître-Vallarta theory,  
which is very important for  
cosmic ray physics.

Main Contact and information

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<http://cusur.udg.mx/22th-symposium/>  
<http://indico.cern.ch/event/1323265/overview>



El Colegio Nacional



# Manuel Sandoval Vallarta

The importance of promoting science in Mexico and  
developing countries.

The importance of cosmic rays.





# Science facing problems

- Scientists' success isn't measured by the quality of their questions the rigor of their methods. It's measured by how much grant money they win, the number of studies they publish, and how they spin their findings to appeal to the public.

- **Academia has a huge money problem**

- Too many studies are poorly designed
- Replicating results is crucial — and rare
- Peer review is broken

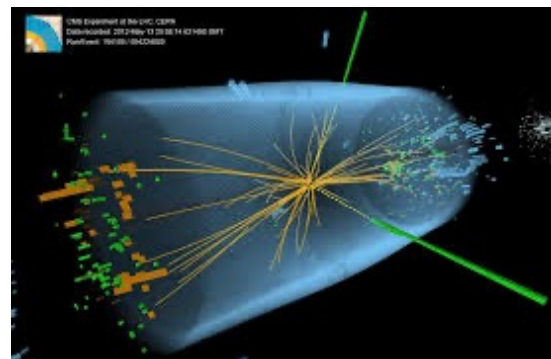
- **Too much science is locked behind paywalls**

- Science is poorly communicated
- Life as a young academic is incredibly stressful

**Mexico and developing countries....**

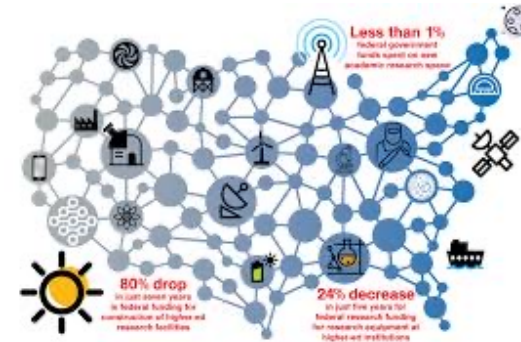
# Scientific biggest problems

- What is the universe made of?
- What do black holes look like?
- Are there other universes?
- Is time travel possible? What is time?
- Are we alone in the universe?
- Can computers get faster?
- Artificial Intelligence
- Water scarcity
- Climate change
- Can we live forever?
- How did life begin?
- What is consciousness?
- Genetically/Artificially modified humans?



# Research Infrastructure

Research infrastructures such as accelerators, probes, synchrotrons, telescopes, research ships, and supercomputers are available to researchers worldwide.



**Mexico and developing countries have an opportunity!**  
**Institutional support and funding are decisive ...**



# High Energy Cosmic Ray

- High-energy astroparticle physics results relevant to particle physics
- Gamma Ray Astrophysics and Astroparticles
- Accelerator experiments relevant to cosmic ray physics
- Space experiment results relevant to high-energy interactions
- Exotic phenomena & searches for new physics beyond SM
- LHC pp & heavy ion physics
- Cross-sections and interaction models
- High-energy neutrinos and muons, including muon puzzle
- Simulation tools for cosmic ray & neutrino physics
- Multi-messenger cosmic ray observations & interpretations
- Future accelerators & cosmic ray experiments



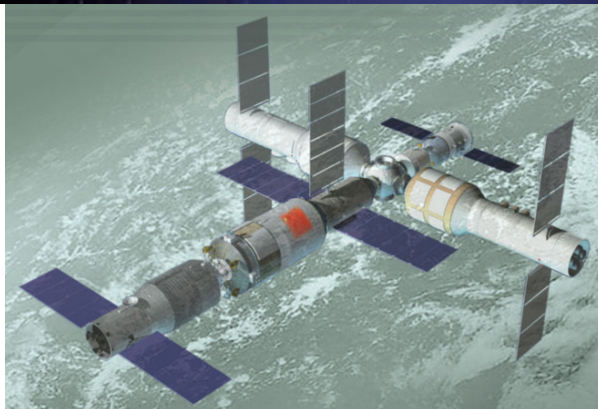
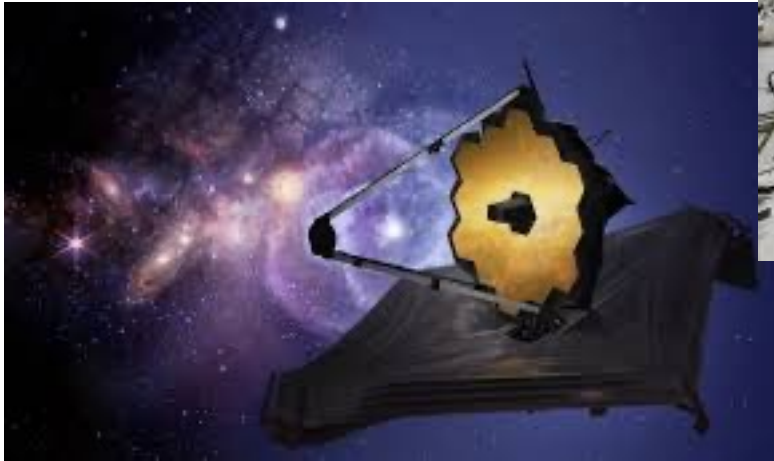
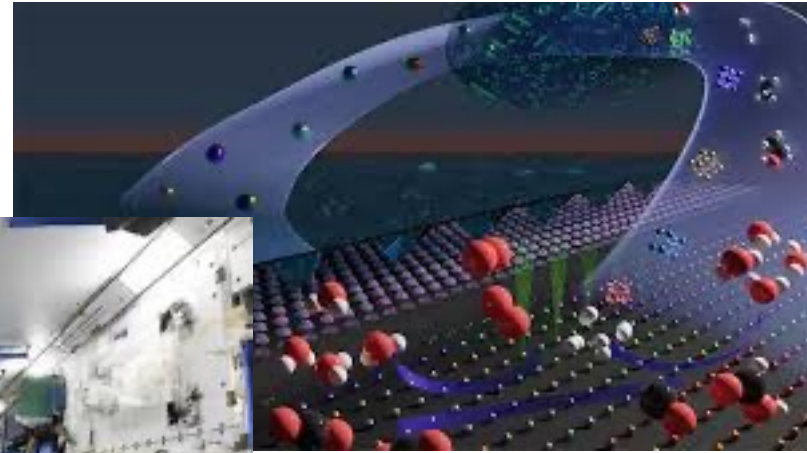


# NanoSpace

To advance the **fundamental** understanding of the physics and chemistry of cosmic carbon nanomaterials (nanocarbons; nC) and their relevance in non-terrestrial environments by promoting the interdisciplinary combination of state-of-the-art astronomical, laboratory, and theoretical studies.



# Aerospace program





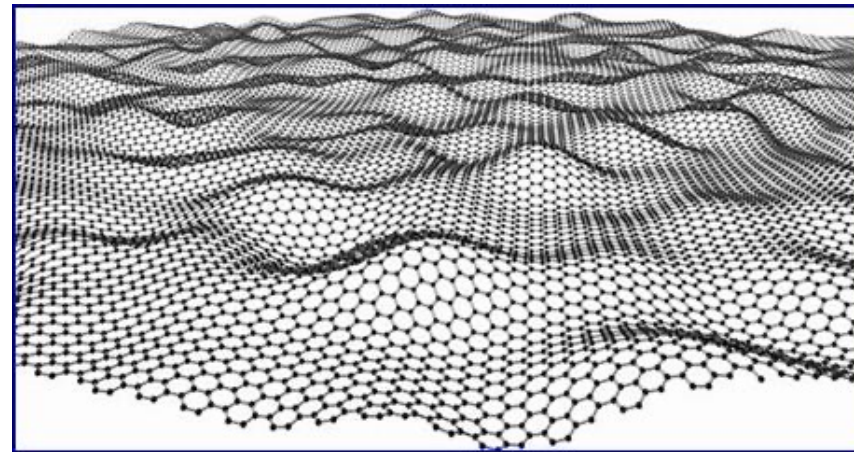
# Dirac Equation



In graphite, electrons interact with each other to hold the material together.

When this coupling is lost, that's when things start to get interesting.

In graphene the electrons behave like massless particles, moving freely throughout empty space at speeds close to to that of light.







**Policies that fund basic research can foster the kind of innovation we need for long-term growth.**