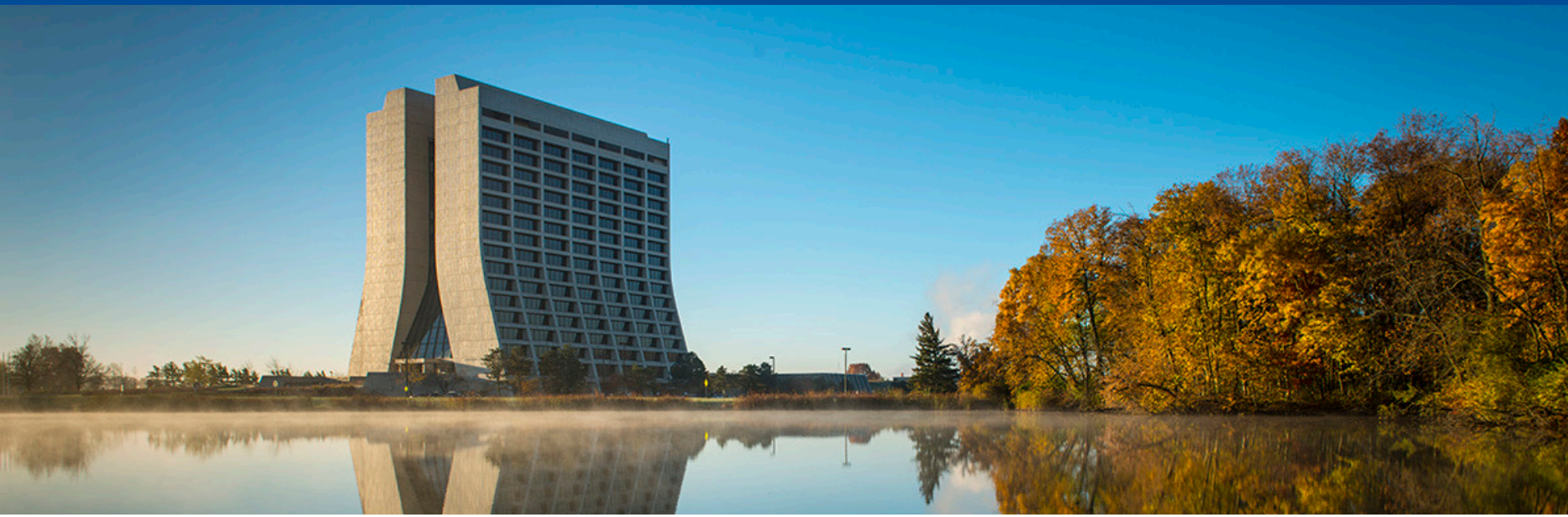


Conéctate con Fermilab
Panel Session: Astrophysics

Panel Chair: Bruce Howard,

Speakers: Ana Martina Botti, Sreevani Jarugula, Gabriela Marques

13 October 2022

My background

- Originally from near Pittsburgh, Pennsylvania
- Bachelor's degree from U of Pittsburgh (Physics/Astronomy) & PhD in Physics from Indiana U (Bloomington, IN)
  - In undergrad, did SULI internship at FNAL in 2013 – MINERvA nu experiment
  - Grad school: DUNE, NOvA nu experiments
- Am now a Fermilab postdoc working on the Short-Baseline Neutrino program, mostly ICARUS
  - Have worked on/with detector systems and was Deputy Commissioning Coordinator
  - Also reconstruction, event selection, analysis
- Have been coming to FNAL since 2013 for different projects over different phases of my career

Astrophysics panel

Ana Martina Botti

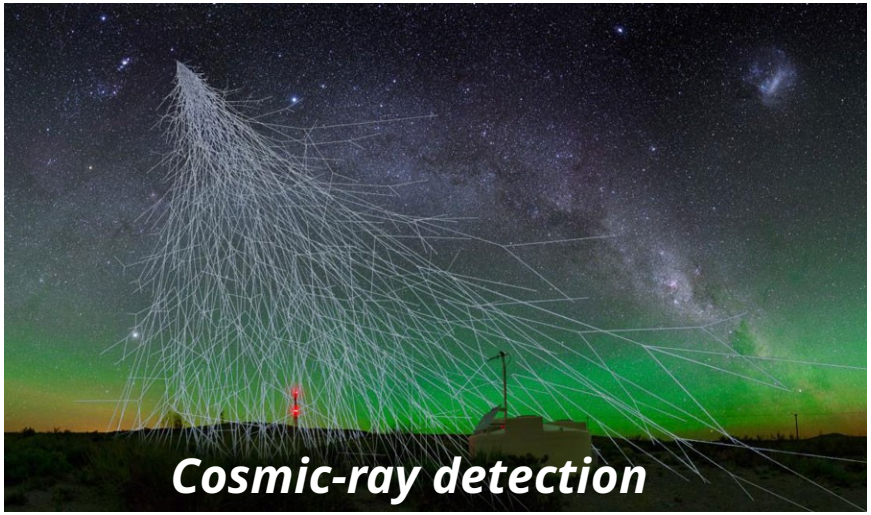
Conéctate con Fermi

14/10/2022

My background

- Physics diploma from Buenos Aires.
- Double doctoral degree in Astrophysics (Argentina/Germany).
- Post-doctoral researcher at Buenos Aires.
- CPC Fellow
- Research associate at Fermilab

A. Chantelauze, S. Staffi, L. Bret

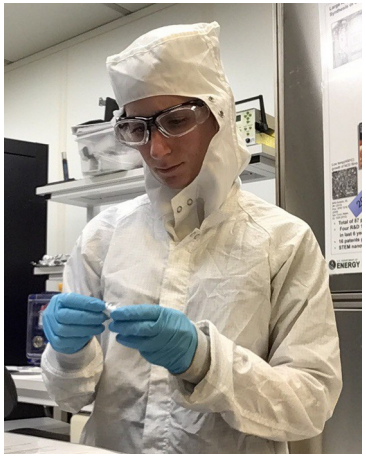


But also…

~ 7 years experience in industry (software development and IT security).

I use this experience A LOT in my everyday work!

Why experimental physics?



- Think, design and build experiments.
- Understand how “things” work (and why the don’t!) and the Physics behind the technology.

Detector

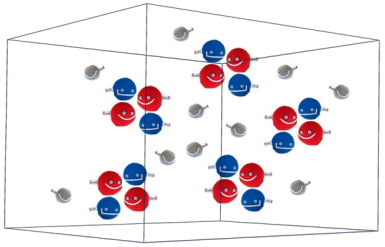
Engineers

- Contribute to answer fundamental questions about nature.
- We work a lot with engineers and technicians (and we learn a lot from them too!).

How to build a detector?

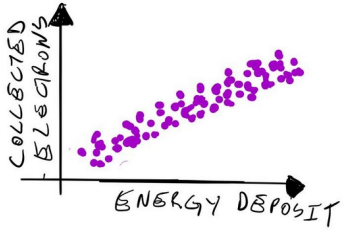
Some idea/s of what DM might be

Some idea/s on how it interacts with known physics



Implement detection principle extending the available technology

Mechanics + electronics + software



Understand the detector and go from signals to a plot

Fermilab

Cosmology with Machine Learning

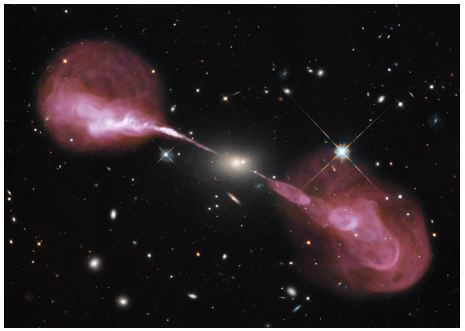
Sreevani Jarugula

13/10/2022

How I came to be at Fermilab…

- Undergrad Major in Physics
  IISER, India
- Summer internship and Masters
  Raman Research Institute, India
- Doctoral Degree in Astrophysics
  UIUC, Illinois
- Postdoctoral Research Associate
  Fermilab Cosmic Physics Center

Radio galaxy with jets

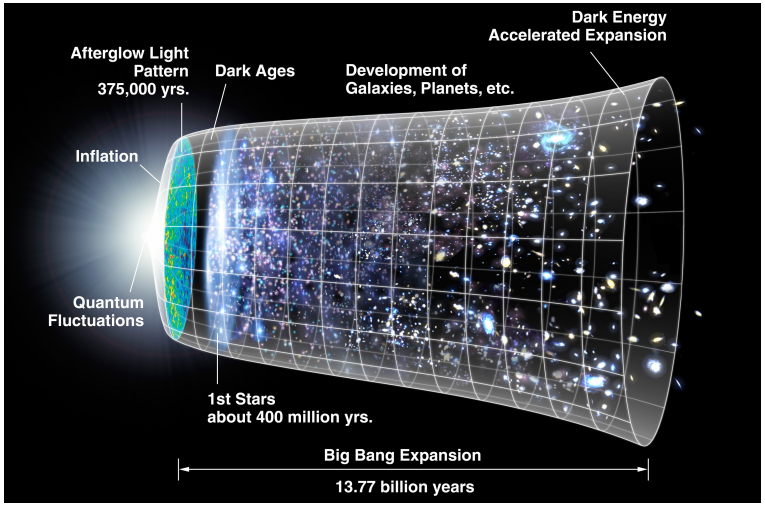


Strong gravitational lensing

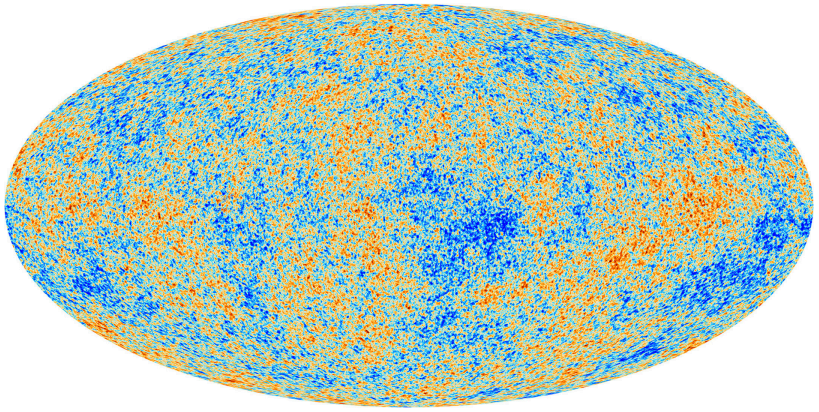
Why Astrophysics?

Pursue Fundamental Questions

- How did the universe form and evolve?

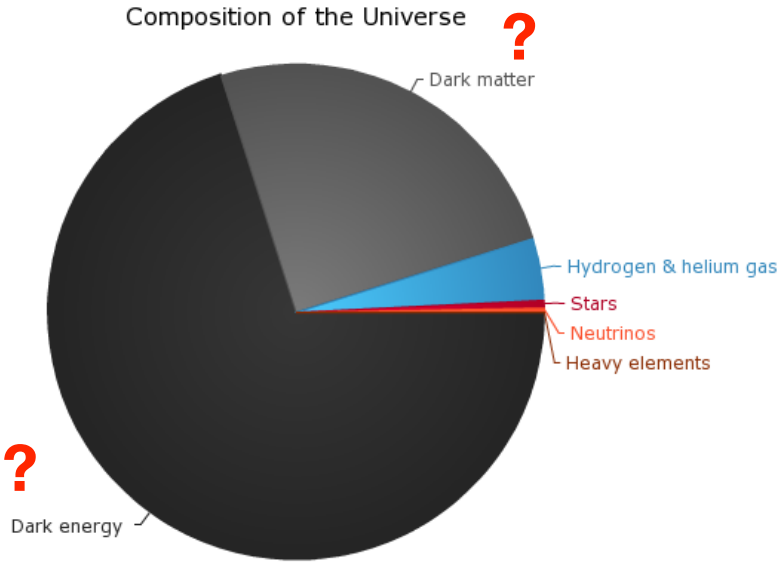


- How does the early universe look like?



Cosmic Microwave Background Radiation

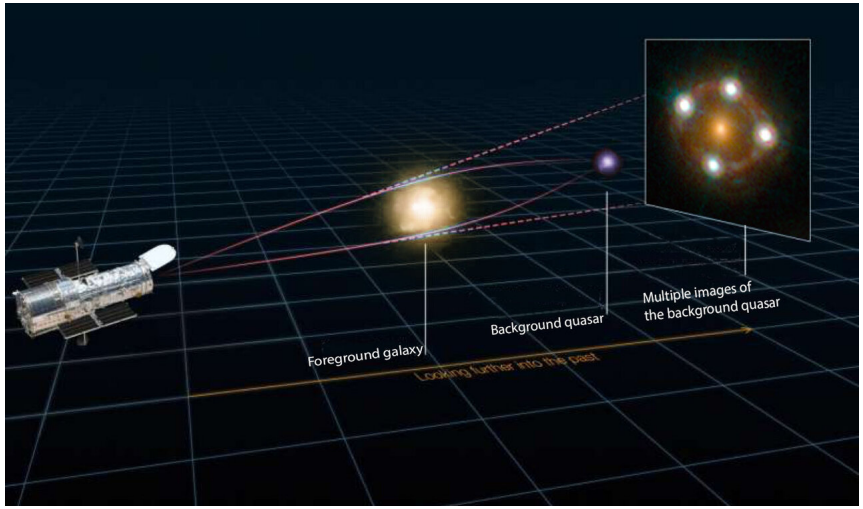
- What is the universe made of ?



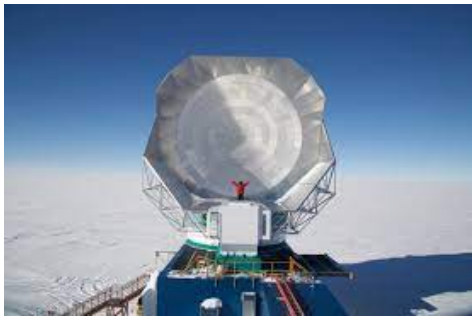
Observations and Machine Learning

Gravitational Lensing

Dark Matter, Dark Energy, and Early Universe



South Pole Telescope

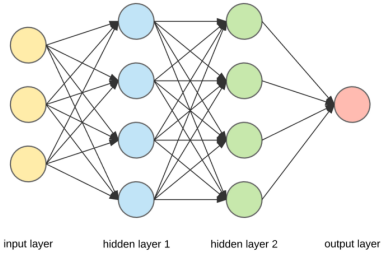


Dark Energy Survey

Rubin Observatory
Large Survey of Space and Time

BIG DATA !

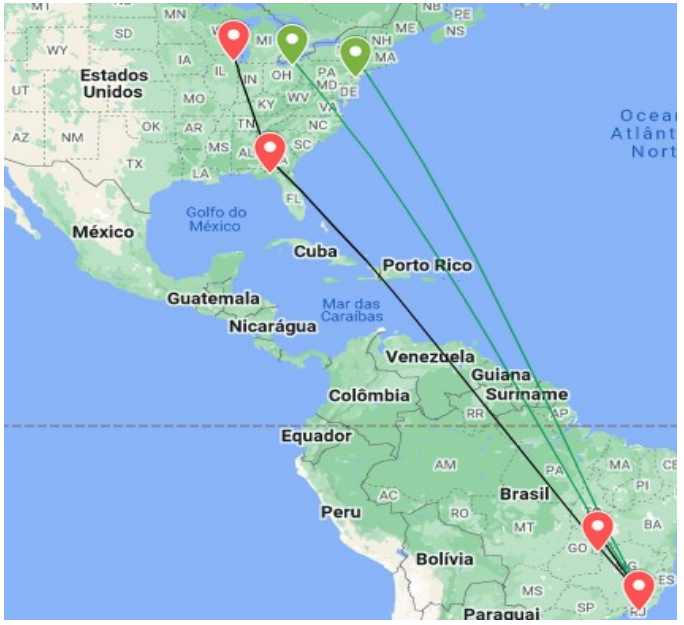
Big Data analysis using Machine Learning



- Classify lenses from surveys
- Estimate foreground and background galaxy properties
- Study expansion of the Universe!

My background

- Undergrad degree in Physics- University of Brasilia, Brasilia, Brazil
- Master and PhD degree in Astronomy- National Observatory, Rio de Janeiro, Brazil
  - Internship at Case Western Reserve University- Cleveland, US
  - Summer student at Princeton University, US
- Post-doctoral researcher at Florida State University- Tallahassee, US
- Now Post-doctoral researcher at Fermilab



Understanding the Universe

- In what kind of universe do we live?
  - What are the fundamental ingredients of our universe?
  - What is the growth rate of structure over cosmic time?
  - What's the precise expansion history?
  - What was the early universe like?
  - How do we use laboratory and Astro observations to learn about these?