A positive and encouraging correlation of multi tracers Roy brought between the two towns 14,000km apart

Shun Saito

Missouri University of Science and Technology

Tuesday, March 11th 2025

Cosmic Roy and and the General Roylativitis

@SAAO, Cape Town, SA

Outline: sorry but not much about science!

- The most important multi-tracers to correlate =
- Let me give a small story on the collaboration between Roy's and my group.

Outline: sorry but not much about science!

- The most important multi-tracers to correlate = **PEOPLE!**
- Let me give a small story on the collaboration between Roy's and my group.

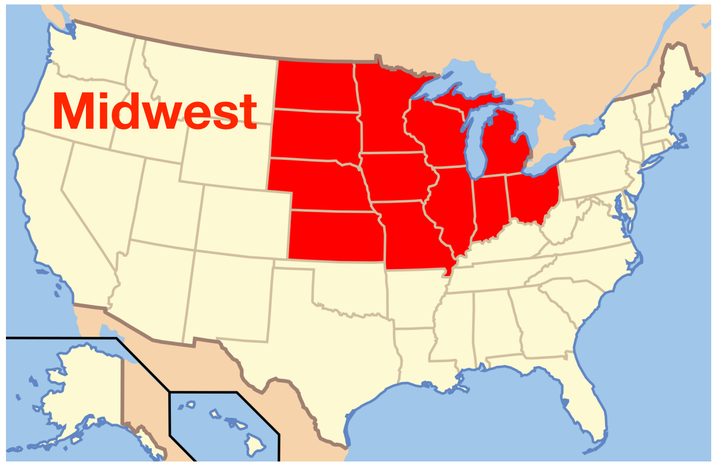
Keep your eyes on *IMAC at Missouri S&T*

➤ I joined Missouri University of Science and Technology in the U.S. in 2019.

➤ Since 2020: ***Institute for Multi-messenger Astrophysics and Cosmology (IMAC)***

at Rolla, MO, USA (100 miles west from St. Louis)

- **Dr. Marco Cavaglia**: Gravitational Wave Physics with LIGO
- **Me**: Cosmology with **Galaxy Surveys** (SDSS-III, **HETDEX**, **PFS, Roman, DESI**)
- **Hoping to add another astro faculty starting this Fall.**



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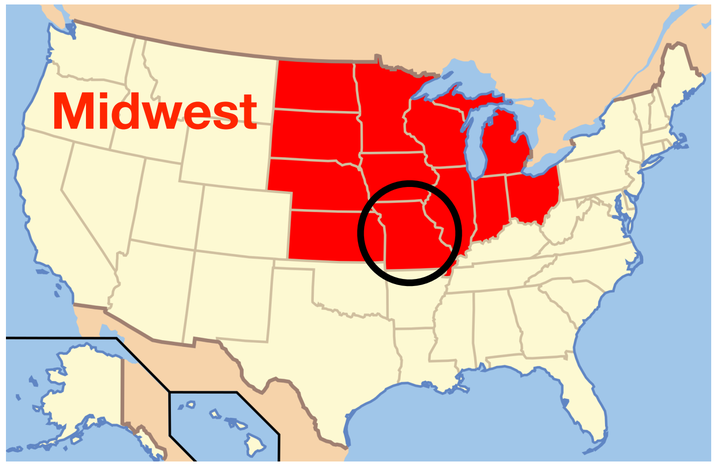

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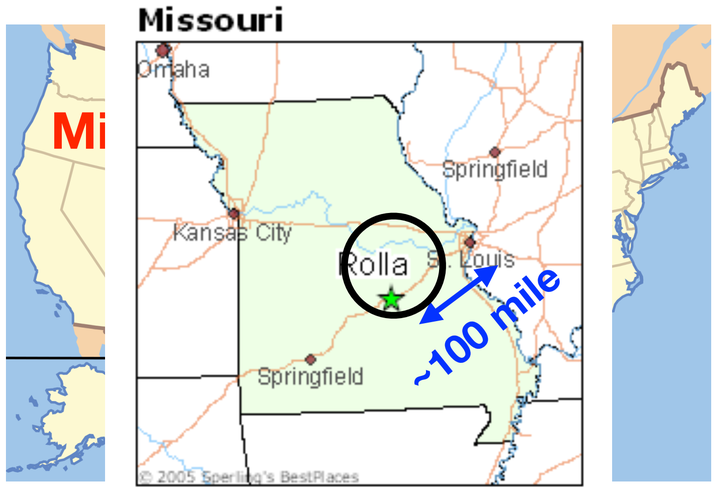

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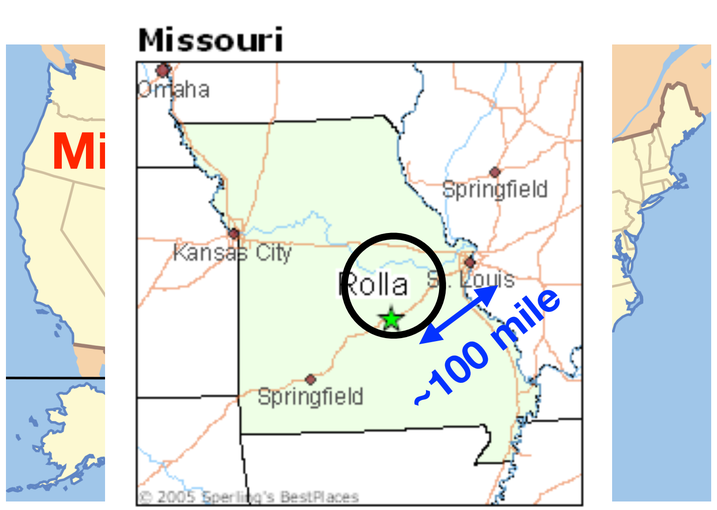

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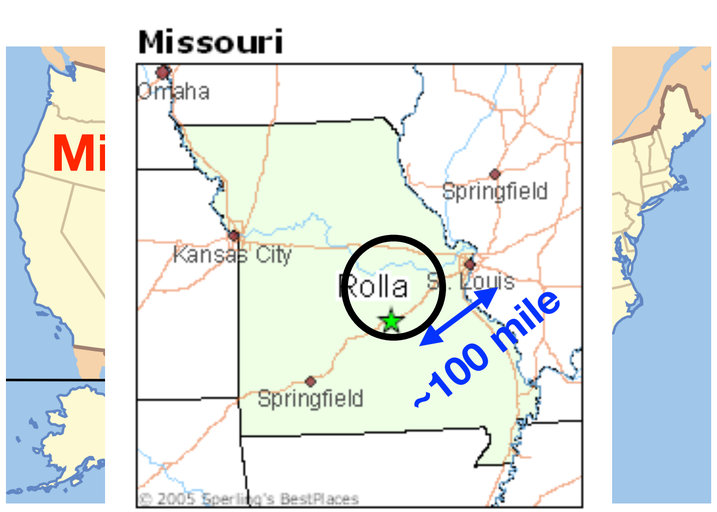

Pre-historical connection between Roy and IMAC

Will we observe black holes at LHC?

Marco Cavaglià*
Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth P01 2EG, U.K.

Saurya Das†
Department of Mathematics and Statistics, University of New Brunswick, Fredericton, New Brunswick E3B 5A3, Canada

Roy Maartens‡
Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth P01 2EG, U.K.
(Dated: November 2, 2018)

The generalized uncertainty principle, motivated by string theory and non-commutative quantum mechanics, suggests significant modifications to the Hawking temperature and evaporation process of black holes. For extra-dimensional gravity with Planck scale O(TeV), this leads to important changes in the formation and detection of black holes at the the Large Hadron Collider. The number of particles produced in Hawking evaporation decreases substantially. The evaporation ends when the black hole mass is Planck scale, leaving a remnant and a consequent missing energy of order TeV. Furthermore, the minimum energy for black hole formation in collisions is increased, and could even be increased to such an extent that no black holes are formed at LHC energies.

Pre-historical connection between Roy and IMAC

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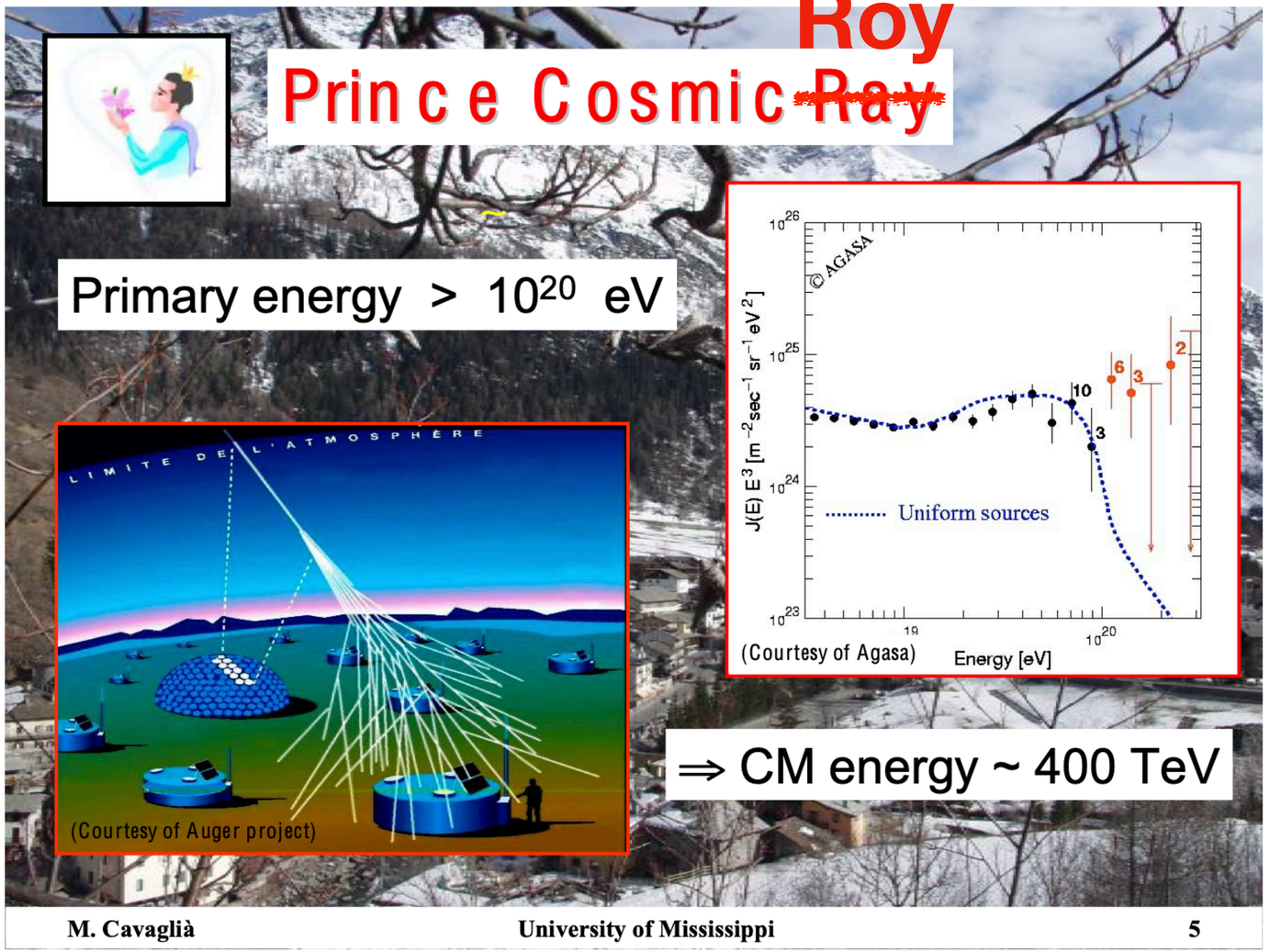


Why and how did Roy and I get connected?

➤ Started from an email **Marco** sent to **Roy** regarding the **UMSAEP** Program in April 2019:

“I'd like to find some common astro/cosmology project that maybe could one day lead to UWC to join LIGO, or bring our two groups closer. There is also another colleague of mine here (Shun Saito) who does cosmology and may be interested in participating.”

➤ **Roy** replied **on the same day**:

“I am definitely keen on exploring collaboration and exchange. We don’t have any GW people at UWC - but there is a lot of interest (me included), plus the SKA will link to GW via pulsar timing indirect detections. **Shun and I have a lot of research areas in common - including the galaxy bispectrum and intensity mapping.**”

➤ **Me** at that time as a hyena for any funding possibilities:

We received the **UMSAEP** funding in 2019, 2022, and 2024 in total of $25k - The first grant I got at S&T.

The first UMSAEP grant winner at the physics department at S&T.

University of Missouri South African Education Program

https://www.umsystem.edu/president/southafrica

➤ A cooperation partnership between UWC and University of Missouri System started in **1986**.

“The cooperative agreement between UWC and the UM System was the first of its kind between a non-white South African university and a U.S. university.”

➤ The UMSAEP supports travel for collaborative work:

- **UM/UWC Faculty Exchange Program**

  Our activity reports are available on https://www.umsystem.edu/president/southafrica/facpgm

- Student exchange

Highlights: UWC-S&T seminar

➤ We started an online zoom seminar between two groups:

Gave **9** junior researchers opportunities to give a seminar talk, focusing on their own work.

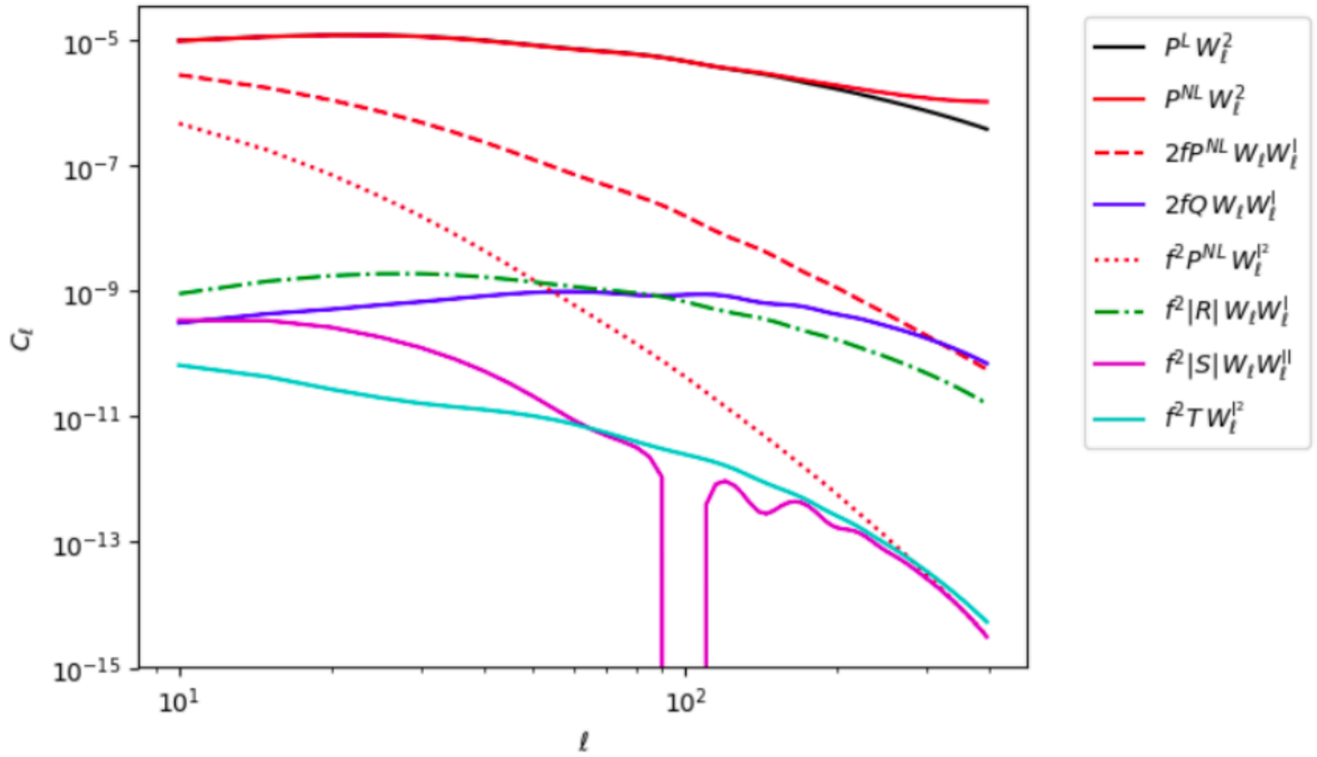
➤ Mario gave us an online colloquium talk at our department in Apr 2021:

Highlights: nonlinear RSD in C_ell

➤ With **Jan-Albert** and **Roy**: apologies for being unpublished [My fault!]

➤ Nonlinear RSD is very different from P(k); see **my MPA lecture note on RSD**.

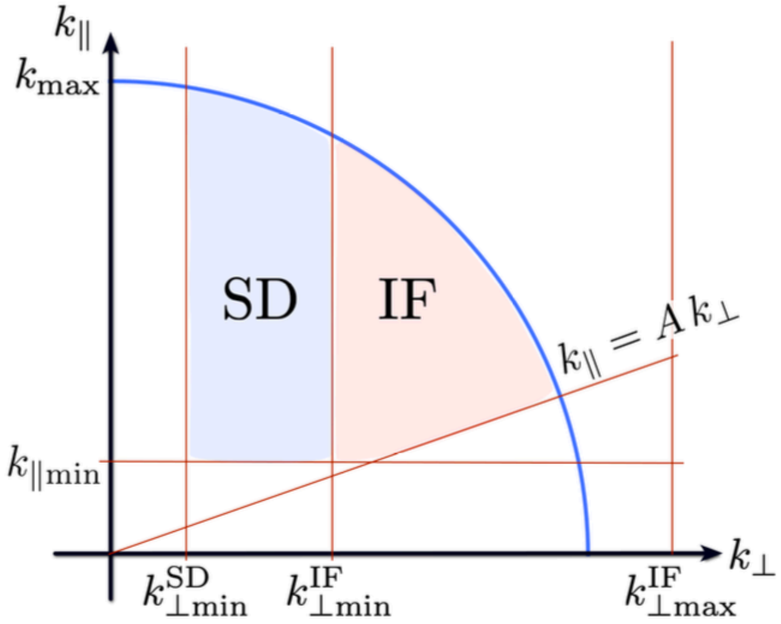
- scooped by **Gebhardt & Jeong (2020)**

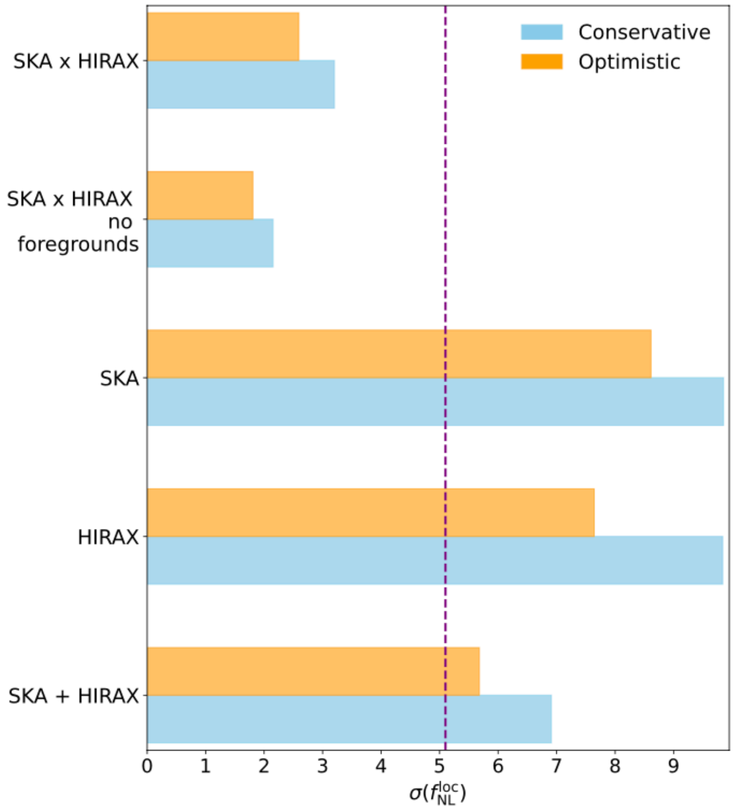


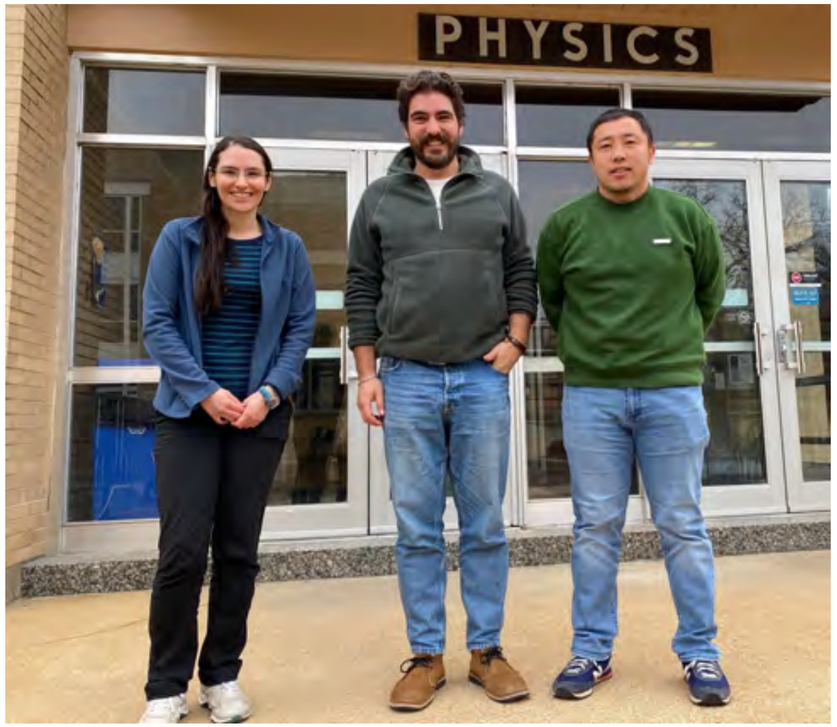
Highlights: Combining SD-IF mode for non-Gaussianity

➤ **Karagiannis+(2024)** including Roy and myself (and Jose, Stefano, and Chris) [see Dio's talk]

➤ **Dio** visited us at S&T and two talks in January 2023.







Happy 70-th birthday, Roy!

- Let us think about how to make him happier in the future: we should be ***CORRELATED MORE***.
- You are welcome to talk to me on **the optical/IR galaxy redshift surveys**:
  - HETDEX: Cosmology SWG chair, 3 first cosmology Key Papers will be out in this year!
  - DESI: Y3 HOD Topical Group lead, **DR2/Y3 BAO results will come out on March 19th**.
  - Subaru PFS: one of the main contributors in ELG target selection
  - Roman Space Telescope: Galaxy Modeling lead in GRS PIT [PI: Yun Wang (Caltech)]
- Many more possibilities/ideas are welcome:
  - Any cross correlation between (radio) IM & these galaxy surveys.
  - **Cole** will give a talk on Thu on "***the more optimal weighting than FKP for multi tracers***".

    → extension to the bispectrum and non-Gaussianity?