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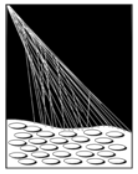
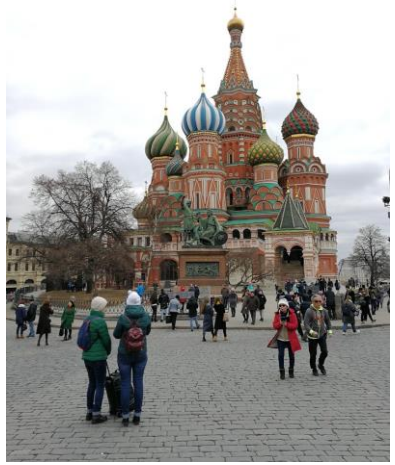
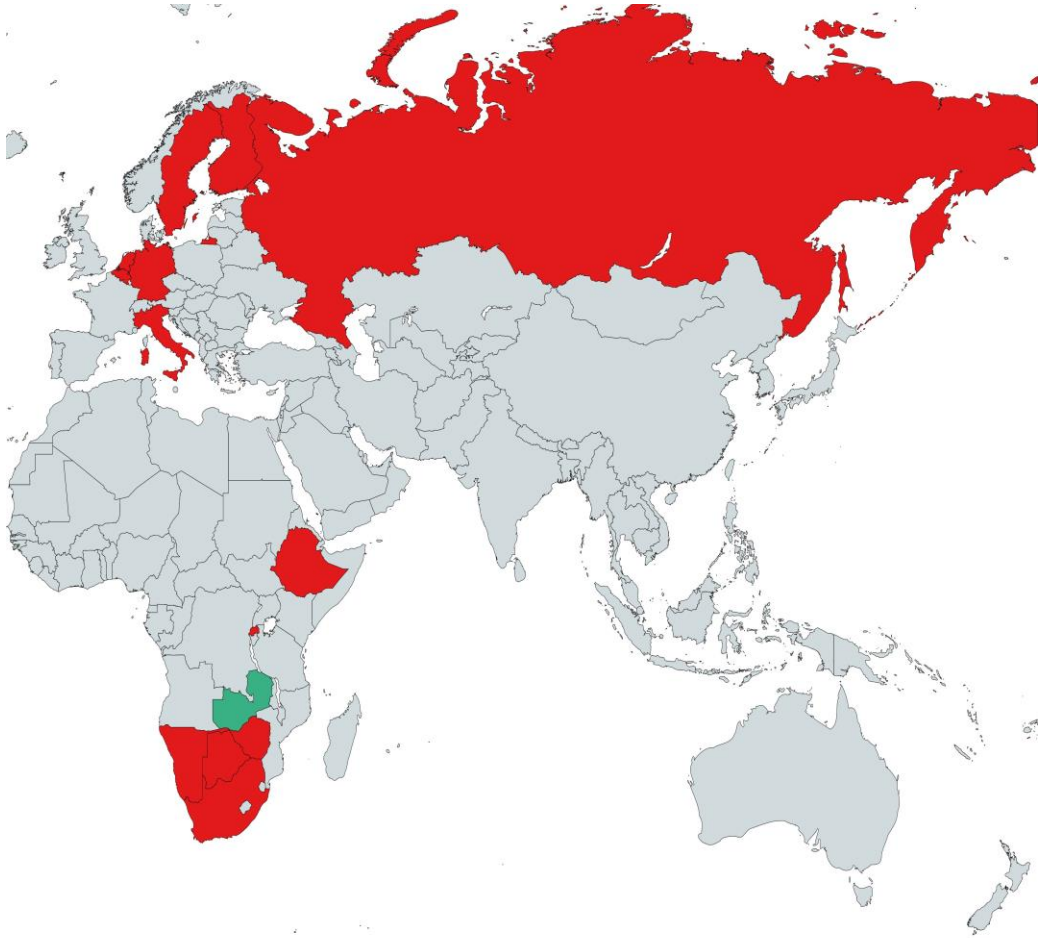
Nikhef

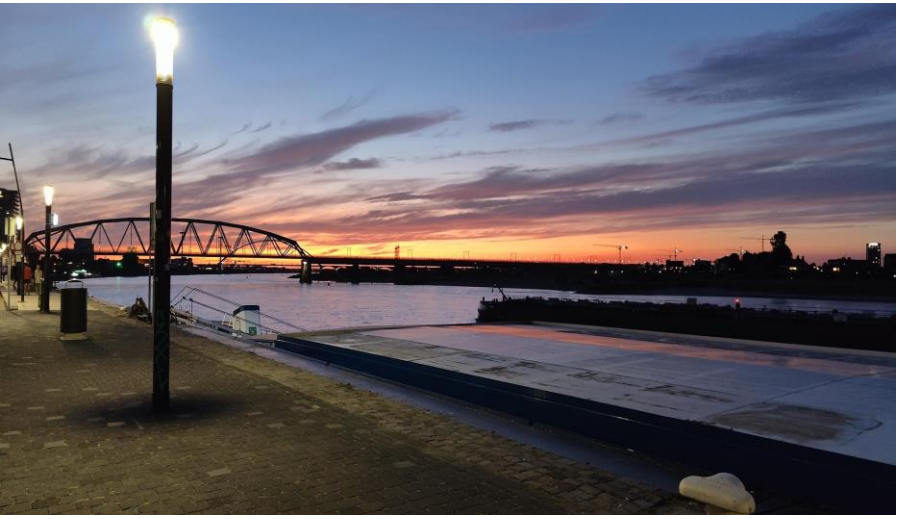


PIERRE AUGER OBSERVATORY

About Me

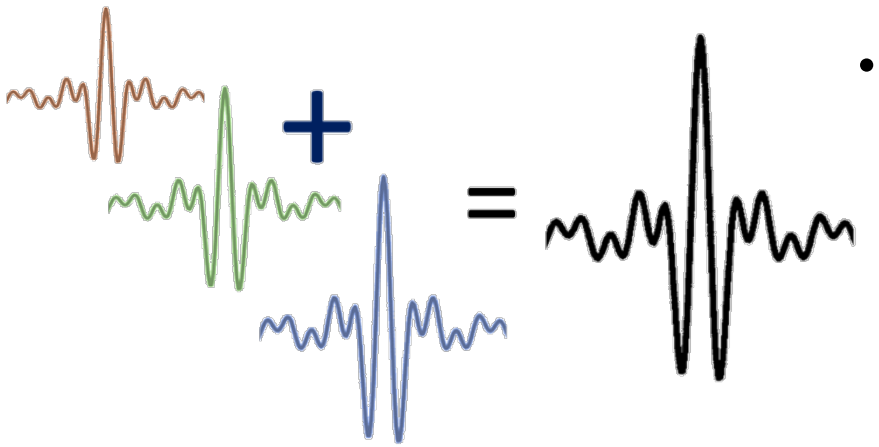






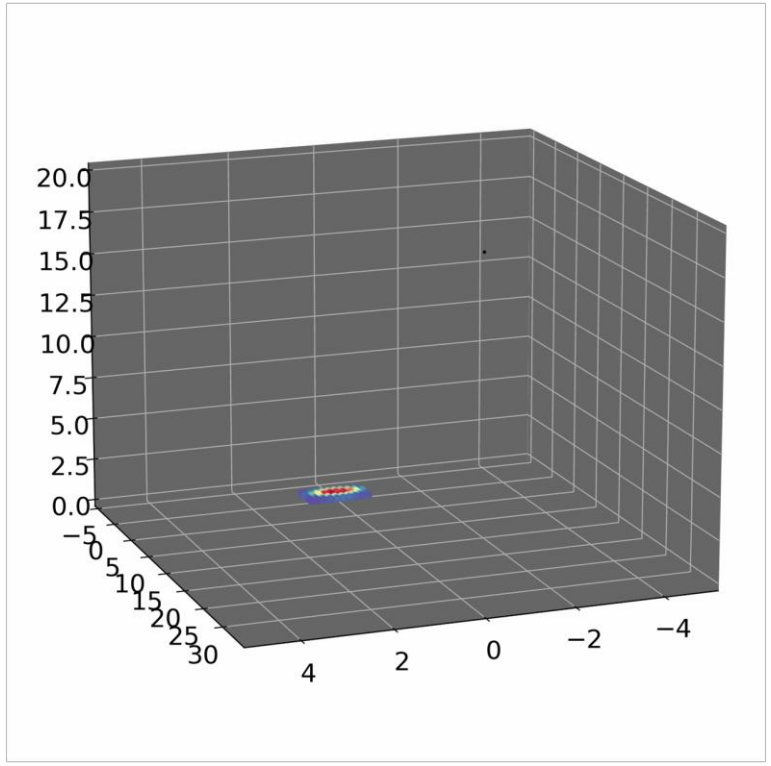
- BSc. University of Zambia (Zambia)
- MSc. National Research Nuclear University (Russia)
- PHD. Radboud University (NL)

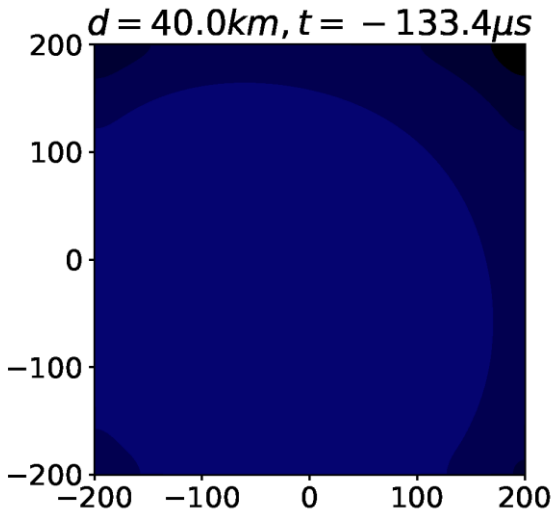
Radio Interferometry for cosmic ray particle identification:

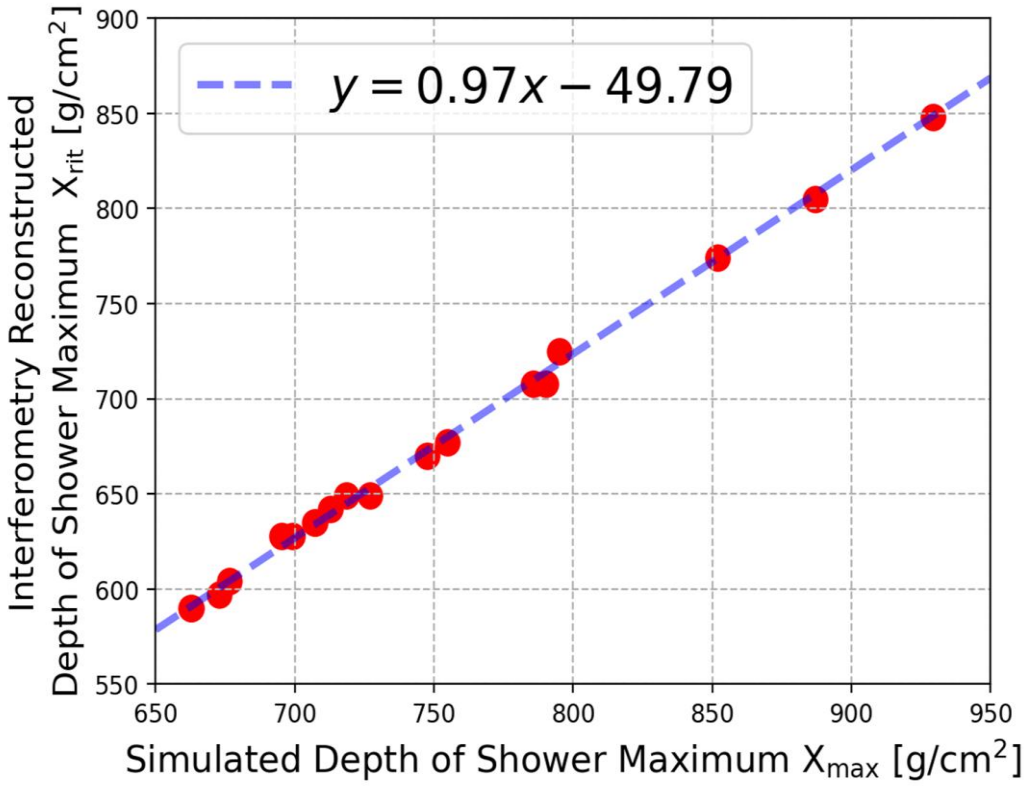


- Beamforming through the sum of the coherent radio signals to determine the depth of the shower maximum (X_{max}).

- Implementation of radio interferometry at the new/improved Auger Prime Observatory.

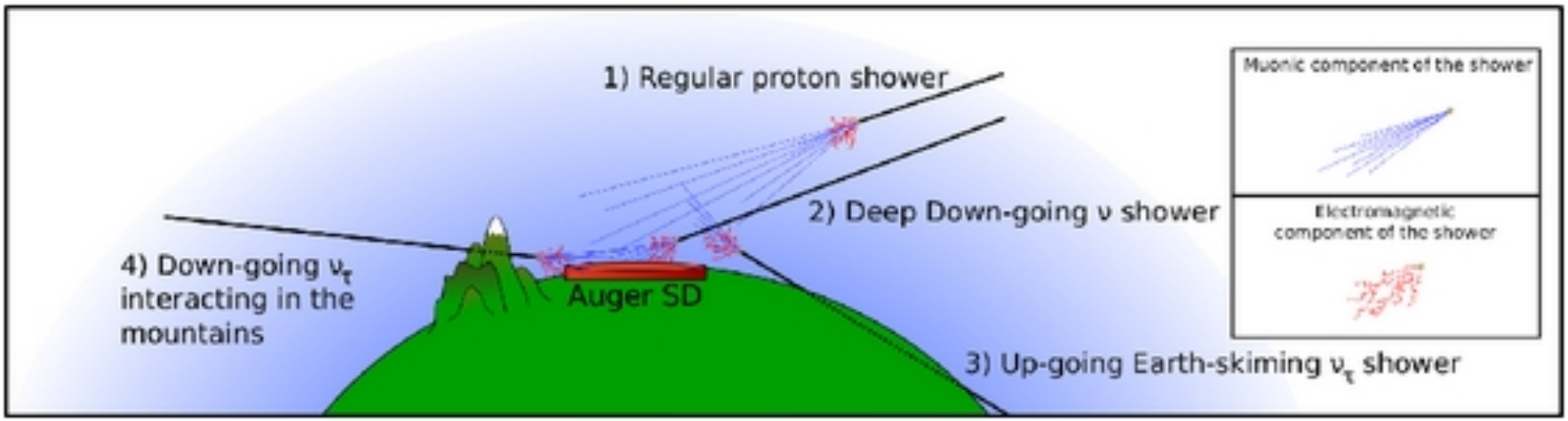






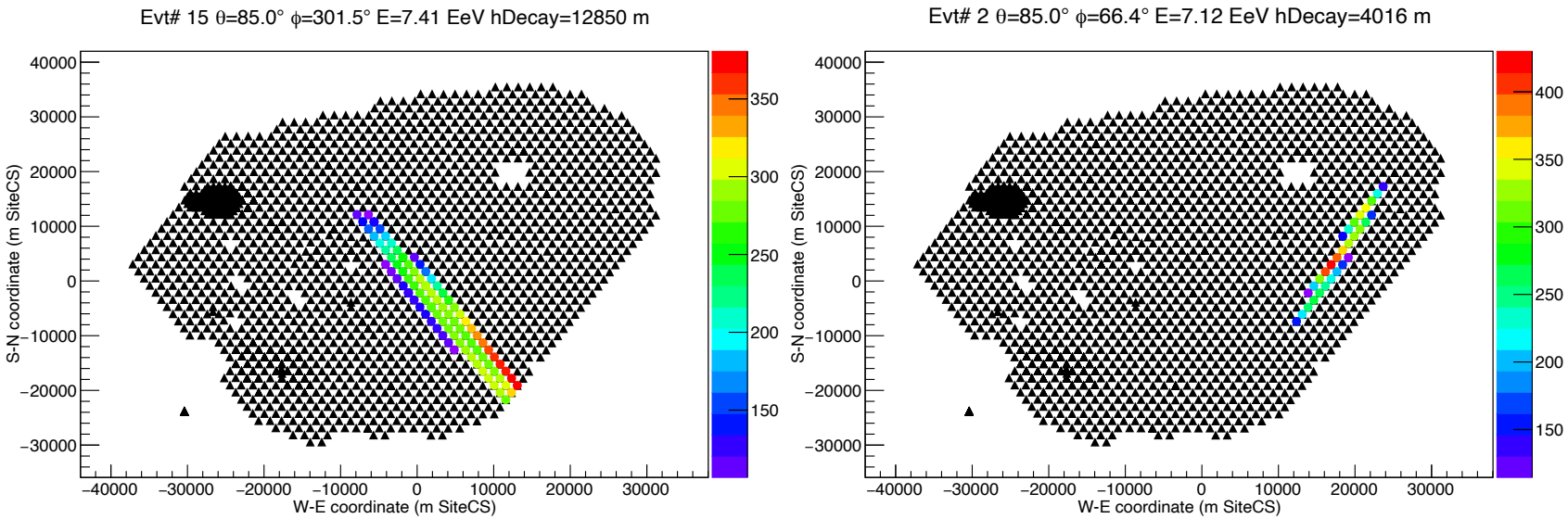
Detecting neutrinos on the AUGER radio upgrade

- 3 main "classes" of events
  - τs from the mountains
  - Downgoing (from ν_{all} CC and NC interactions in the atmosphere)
  - Upgoing τs
- Shower geometry depends on where the interaction/decay occurs
- AUGER-RD: Large antenna spacing and low gain at high θ
  - Problem: Large spacing favors high θ, gains favor low θ



Example neutrino events at $\theta = 85^\circ$ using RDSim

- RDSim: fast and comprehensive simulation based on a superposition toymodel: Estimate what is possibly detectable
  - Downgoing CC and NC events.
  - Mountain τ events
  - Can propagate τs before decay.
  - Simple radio only trigger with simplified antenna gain

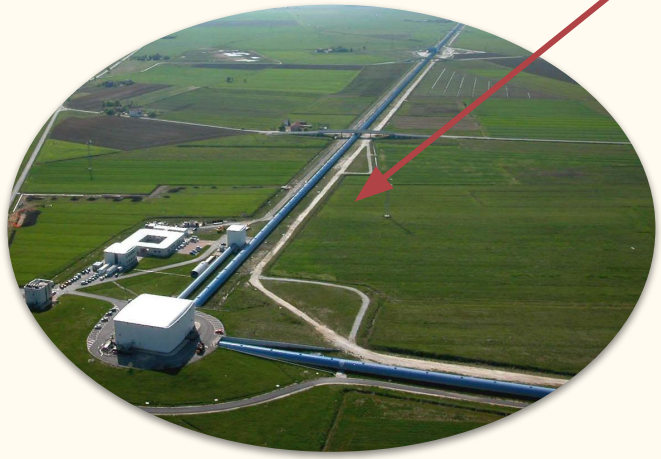


Questions?

Other applications of Radio...

Where from:

Commissioning and optical simulations for the Advanced Virgo gravitational wave detector



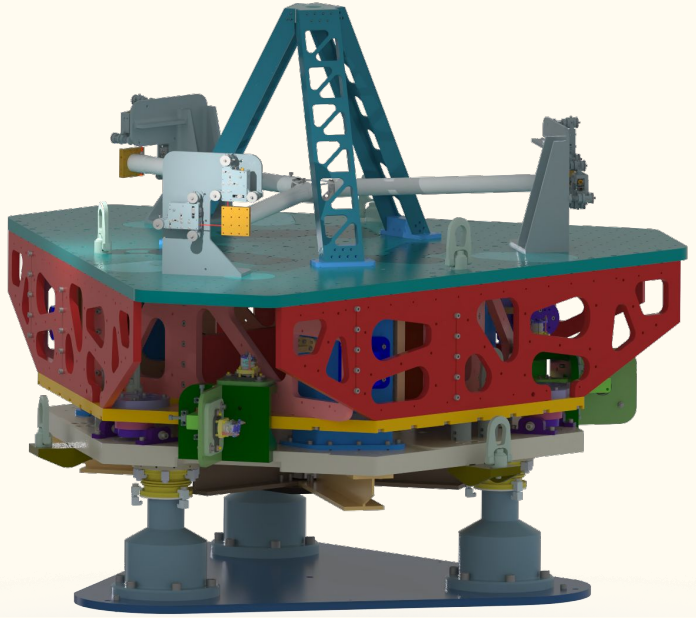
Val di Non, Trentino, Italy

Nikhef

VU VRIJE UNIVERSITEIT AMSTERDAM

What now:

Postdoc at VU Amsterdam-Nikhef, developing the Omnisens experiment



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Omnisens: Reimagining seismic isolation for future generations of gravitational-wave detectors:

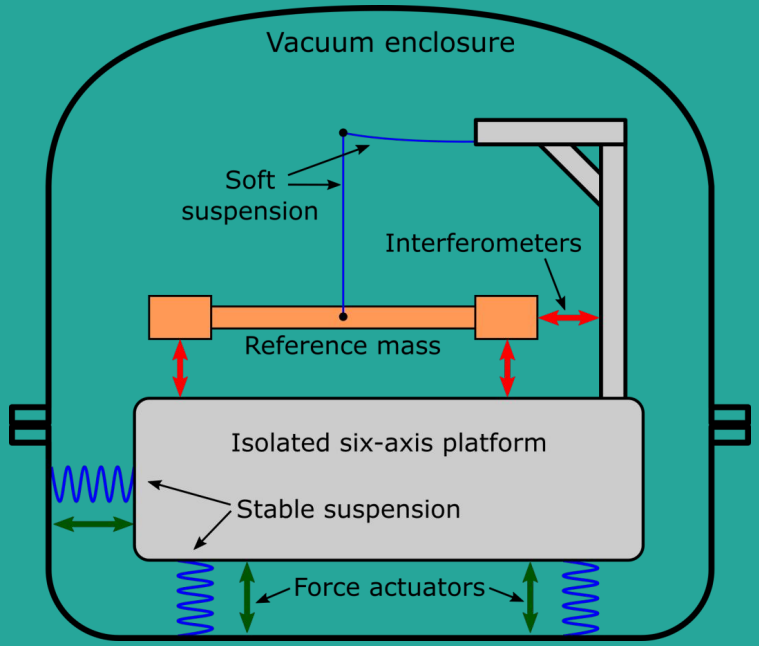


Image credit: C M Mow-Lowry and D Martynov 2019 *Class. Quantum Grav.* **36** 245006

MACHINE LEARNING THE UNIVERSE

OLEG SAVCHENKO

1st year PhD student at GRAPPA

- Did my bachelor's in Kyiv, Ukraine, and then master's in Cambridge, UK
- Background in theoretical physics
- Worked on inflationary cosmology in undergrad
- Got interested in machine learning, and that's how I ended up doing my PhD!

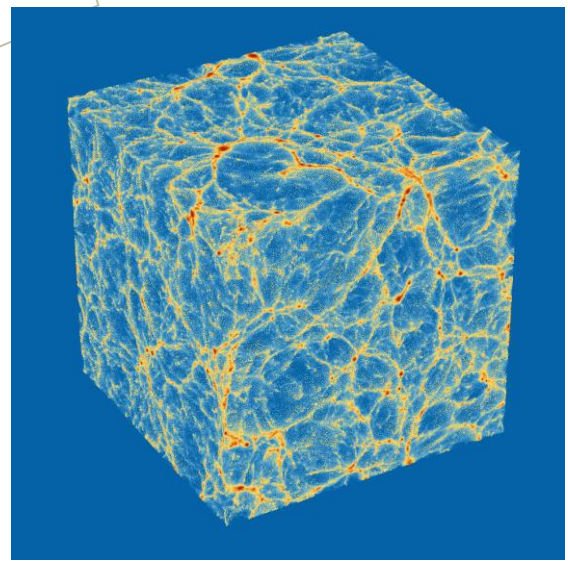
Supervisor
CHRISTOPH WENIGER

UNIVERSITEIT VAN AMSTERDAM

GRAPPA
GRavitation AstroParticle Physics Amsterdam

SWYFT

TRUNCATED MARGINAL
NEURAL RATIO ESTIMATION



I WORK ON:

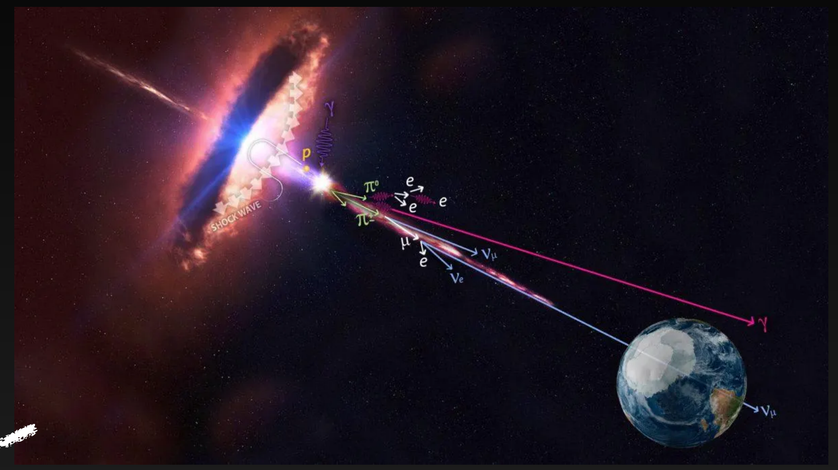
- Applications of Machine Learning to Cosmology
- Simulation-based Inference
- Statistical Reconstruction of Cosmological Initial Conditions
- Cosmological Simulations
- Graph Neural Nets

Right now, I collaborate a lot with a postdoc from my group, Guillermo Abellán.

Would be happy to talk to anyone interested in these topics!
Please contact me at **o.savchenko@uva.nl**

Krishna Nivedita

The Radar Echo Telescope

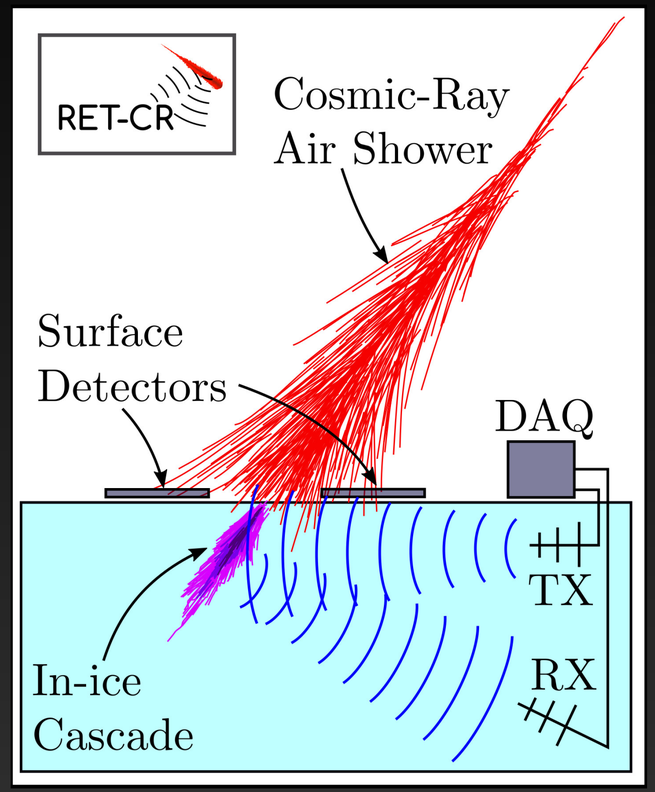


Detection of Ultra high energy neutrinos

Uses radar reflections for detection

Radboud University

TEST BED EXPERIMENT : RADAR ECHO TELESCOPE FOR COSMIC RAYS



RET-CR Concept

Thank you!

Cosmic Particles - Charles Timmermans

Now: AugerPrime

Cosmic Particles - Charles Timmermans

Now: AugerPrime

PostDoc Position Available!

Cosmic Particles - Charles Timmermans

Future: GRAND

Commissioning Prototypes!