

# FuSe COST Action & Best Poster Award

**Aneta Wojnar**

FuSe COST Action Chair

University of Wrocław

1st Training School on Testing Fundamental Physics with Seismology  
COST Action FuSe (CA24101)

HUN-REN Balaton Limnological Research Institute, Tihany, Hungary



**FuSe**  
TESTING FUNDAMENTAL  
PHYSICS WITH SEISMOLOGY

**cost**  
EUROPEAN COOPERATION  
IN SCIENCE & TECHNOLOGY



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LET'S EXPLORE THE HIDDEN CONNECTIONS  
BETWEEN EARTHQUAKES AND FUNDAMENTAL LAWS OF PHYSICS

# Bridging Physics & Seismology!

## Main Challenge

The main aim and objective of the Action is to bridge fundamental physics and Earth scientists, focusing on seismic data's potential to uncover new physics. Through interdisciplinary collaboration, advanced methodologies, and SME engagement, it advances understanding of Earth's structure, astrophysical phenomena, and improves natural catastrophe alert systems.



## How we work - FuSe in a nutshell

**WG1 – Fundamental Physics:** builds the theoretical basis for understanding fundamental interactions, gravity, and matter, and helps connect models with seismic and astrophysical observations.

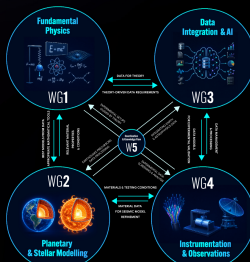
**WG2 – Planetary & Stellar Physics:** improves models of the Earth and other celestial bodies, studies interiors, seismicity, and earthquake precursors, and uses deeper seismic, geodetic, and neutrino data.

**WG3 – Data Integration & Engineering:** turns heterogeneous data into AI-ready, FAIR-compliant streams and develops common data workflows and tools.

**WG4 – Experiments, Observations & Instrumentation:** links theory to real measurements through experiments, observatories, and advanced instrumentation.

**WG5 – Integration of WGs 1-4:** unites all groups, harmonizes terminology and methods, constrains models, and helps identify signatures of new physics.

## Working groups



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PHYSICS WITH SEISMOLOGY

Pan-European network FuSe: a new frontier in exploring seismic phenomena and earthquake precursors

FuSe investigates whether seismic and geomagnetic signals can reveal traces of new physics, while also improving models of Earth's interior. The project focuses on collaboration between physicists, geophysicists, and other specialists, shared data standards, and AI-ready, FAIR-compliant tools. It also emphasizes collaboration with SMEs and the development of sensors, AI algorithms, and alert systems for natural hazards.



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LIKE OUR SOCIAL MEDIA

FuSe COST Action



CONNECTING  
THE VERY SMALL  
WITH THE VERY LARGE

UNDERSTANDING EARTH  
UNLOCKING THE UNIVERSE

Contact [malgorzata.badowska@uwr.edu.pl](mailto:malgorzata.badowska@uwr.edu.pl) for graphical materials.

COST (European Cooperation in Science and Technology) is a funding organisation for research and innovation networks

## What is a COST action?

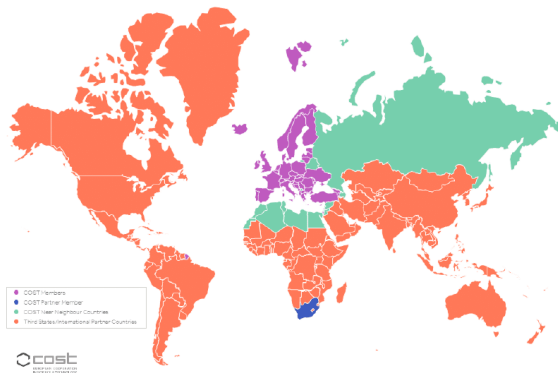
European **networking programme** connecting researchers and innovators across countries and disciplines, supporting collaboration, training, and knowledge.

- **Does not fund research, but networking activities:** meetings, workshops, missions, and training schools
- **Promotes interdisciplinarity, geographical balance, and gender equality:** increase research communities access to funding and infrastructures
- **Bottom-up structure:** topics are proposed by researchers themselves



## From proposal to open collaboration

- A COST Action begins with a **proposal** submitted by a group of researchers (“proposers”) from at least seven COST member countries.
- Once the proposal is **approved and funded**, the Action becomes open: **any researcher, institution, or company** from COST member states (and beyond) can freely **join** and contribute to its activities during its four-year duration.



<https://www.cost.eu/about/strategy/international-collaboration/>

## Working Groups

| Number | Title                                         | Leader                            |
|--------|-----------------------------------------------|-----------------------------------|
| 1      | Fundamental physics                           | Dr Gergely Gábor BARNAFÖLDI ✓     |
| 2      | Planetary and stellar physics                 | Dr Severine ROSAT ✓               |
| 3      | Data integration and engineering              | Dr Elena Simona APOSTOL ✓         |
| 4      | Experiments, observations and instrumentation | Prof Juan Angel SANS TRESSERRAS ✓ |
| 5      | Integration of WGs 1-4                        | Dr Virginia STRATI ✓              |

# FuSe has strong roots in Budapest, Hungary (Wigner Centre)

Anna Horvath during a conference in Lisbon (Dark Stars, 2023); later met Gergely Barnafoldi remotely (although, according to the birds' chirping, we had already met in 2019 in Armenia at a Neutron Stars conference....)

- Gergely was the very first person to become interested in my weird paper on using seismic waves to test gravity, on which FuSe is based.
- Gergely - the WG1 Leader
- Anna – a member of the outreach group (social media, posts, etc.). You may join the group!
- Edit Fenyvesi and Peter Van - local supervisors for traineeships for students from UWr.
- Gergely, Anna, Edit, and Peter (+ Mate Pszota and Ildikó Fazekas) are the LOC of the FuSe School.



# Let's say a few words about the science behind FuSe

In FuSe, we are kind of obsessed with waves.

**If it oscillates, we are interested.**

- *Seismic waves*:
  - provide information about the interiors of astrophysical bodies (planets and stars) — a **theory-dependent** procedure;
  - enable tests of theories of gravity, models of dark matter and dark energy, as well as particle physics.
- Possible additional *oscillation modes* in astrophysical bodies:
  - searching for signatures of a fifth force and other new physics.
- *Gravitational waves*:
  - probe the “cosmological fluid”;
  - probe the interiors of the Earth and the Moon;
  - (earth)quakes? 🤖
  - probe extra dimensions.

Don't hesitate to contact us to join our scientific projects!

# Poster session - Best Poster Award



You will receive an official invitation to present your results and scientific interests at one of our seminars\*.

\*from one of our Working Group Leaders

## 6 Best Poster Awards...

... divided into two categories:

- Best Poster Pitch Award
- Best Poster Award

All six awardees have secured COST-reimbursed participation in one of our two events in 2027 (see the next slides)\*.

The first-place winners of the Best Poster and Best Poster Pitch competitions will be invited to give a presentation in a special oral session at the 2027 Conference (or at the 2027 Training School if they are unable to attend the Conference)\*.

You will also be featured on our social media channels (interview, presentation of your scientific interests, etc.).

\*However, you must have an eligible affiliation (see the COST Annotated Rules).

# Upcoming event: 2nd FuSe Conference, Wrocław 2027

## FuSe@Wroclaw 2027

**Dates: June 21-25**

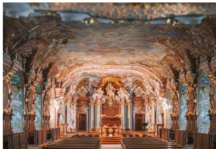
**Expected per diem:**

**~170 EUR**

**Travel expenses:**

**~350Euro**

**Wrocław** is one of Poland's most charming and vibrant cities, offering a unique blend of history, culture, and modern urban life. Famous for its picturesque Market Square, Gothic Cathedral Island, and UNESCO-listed Centennial Hall, the city captivates visitors with its architectural diversity and lively atmosphere. Built around the Odra River, Wrocław features numerous bridges, islands, and riverside boulevards that invite walking and relaxation. The city is also known for its dynamic cultural scene, festivals, cafés, and green spaces. The city is also home to the University of Wrocław, one of the oldest and most prestigious universities in Central Europe, renowned for its academic excellence and international outlook.



**LOC: (University of Wrocław)**

**Magdalena Matusiak-Matek**

**Krzysztof Moskwa**

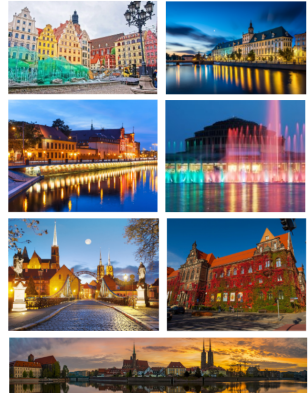
**Tomasz Trześniewski**

**Artur Barasiński**

**(Aneta Wojnar)**



**Main lecture hall**



(Friday, June 25th: Conference Karaoke Party at Świebodzki!)

# Upcoming event: 2nd FuSe Training School, Osijek 2027

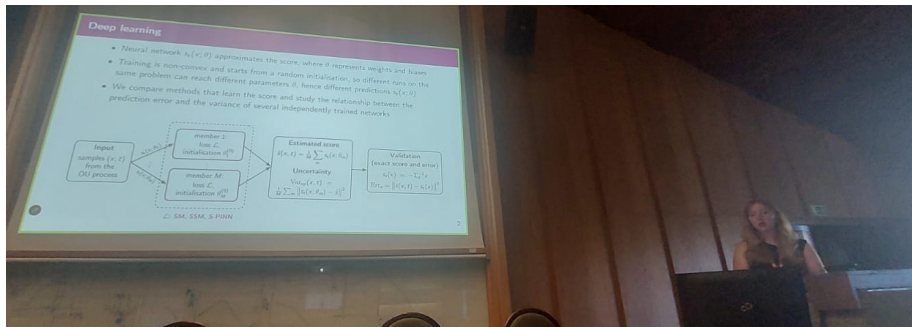
August 31 – September 4; Osijek, Croatia



Jelena Strišković (LOC) and AW (SOC) - follow us!

# Best Poster Pitch Award - 3rd place

Nikolija Cuckić



Choose your event! :)

# Best Poster Pitch Award - 2nd place

Bartosz Izydorczyk



Choose your event!

# Best Poster Pitch Award - 1st place

Daniele Caruana



Choose your event and start preparing your oral presentation! :)

# Best Poster Award - 3rd place

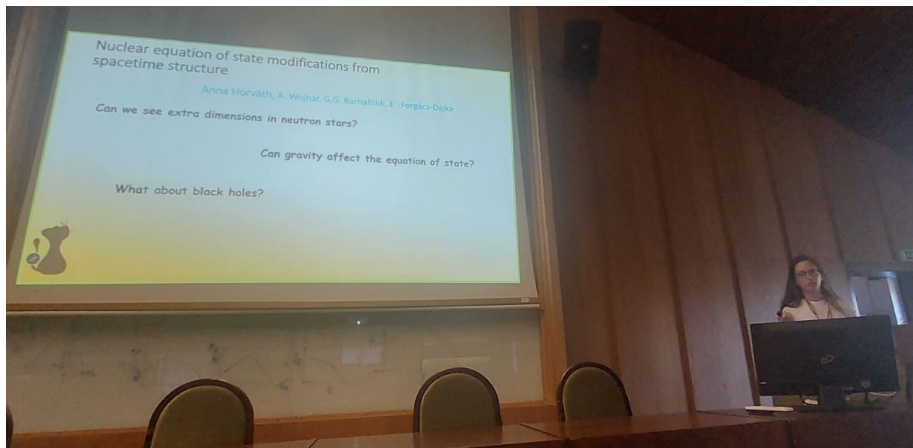
Mazzlum Kamberi



Choose your event! :)

# Best Poster Award - 2nd place

Anna Horvath



Choose your event! :)

# Best Poster Award - 1st place

Magdalena Bochnak



Choose your event and start preparing your oral presentation! :)

# Take-Home Message

- Stay tuned! We have many scientific opportunities for you.
- Follow FuSe on social media for more information.
- Share your science via our social media channels.
- You can find your photos from the event there. Share them with your peers!
- Use waves as a tool for understanding nature.
- Last chance to sign the COST attendance lists!!!
- Please claim your reimbursement this week. Double-check everything before submitting it (see the Annotated Rules).

[aneta.wojnar@uwr.edu.pl](mailto:aneta.wojnar@uwr.edu.pl)



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# Our organizers



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Thank you!! ♥



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