2024 CAMK ANNUAL MEETING

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Astrocent Group 3

CAMK, Warsaw, 31.01-02.02.2024

ASTROCENT
NICOLAUS COPERNICUS ASTRONOMICAL CENTER OF THE POLISH ACADEMY OF SCIENCES

European Funds Smart Growth
Republic of Poland
FNP Foundation for Polish Science
European Union European Regional Development Fund

Astroent Group 3
Electronics and Data Acquisition and Processing
Members - 2023

Mariusz Suchenek (leader)

Marcin Ziembicki (postDoc)

Marek Cieślar (postDoc)

Mateusz Pietrzak (phd student)

Andrzej Rychter (technician)

Kamil Rudnicki (technician)

Edit Fenyvesi (postDoc)

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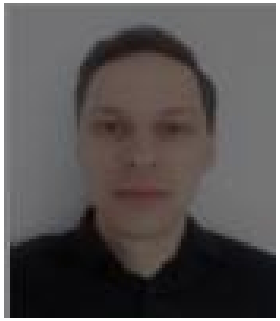

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Newtonian noise based on LNGS

Acoustic NN is not negligible

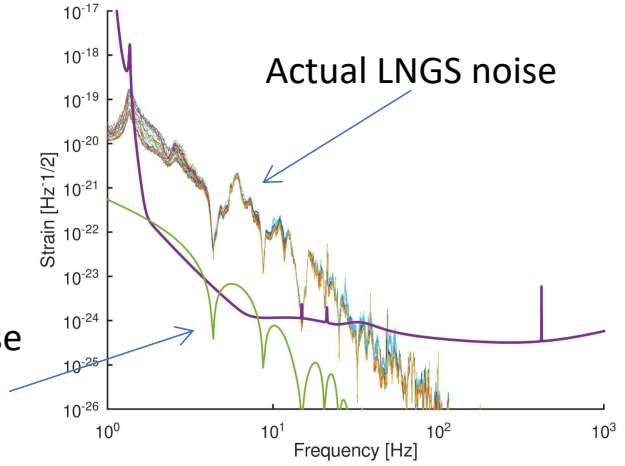
Assume a geometry of detector: hall 100m x 20m x 25 m

Calculations in Fiorucci etal. 2018

LNGS measurement can be considered as upper limit

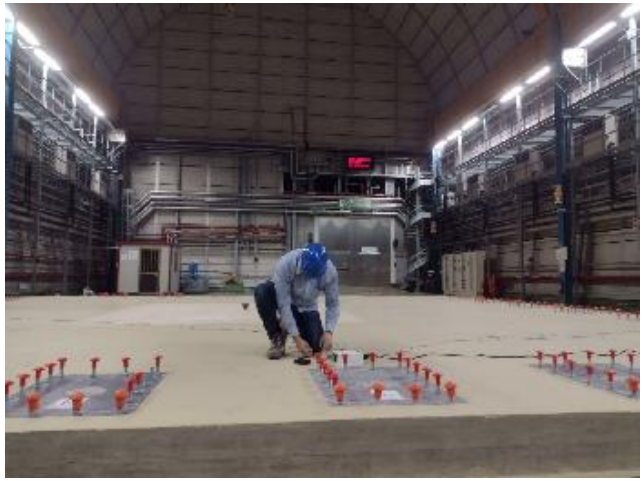
Noise level in tunnels is too high

Lower limit - from ambient noise can also affect ET sensitivity



Actions to lower this noise:

- silence all equipment
- decrease pressure
- build ET in several smaller halls

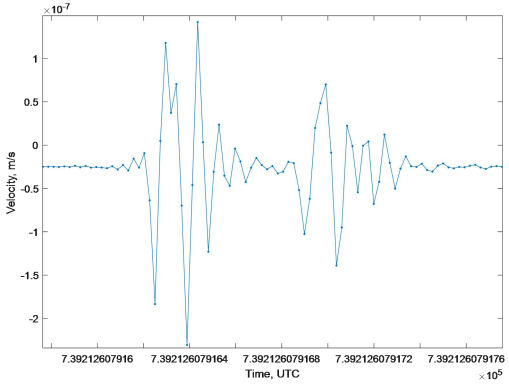


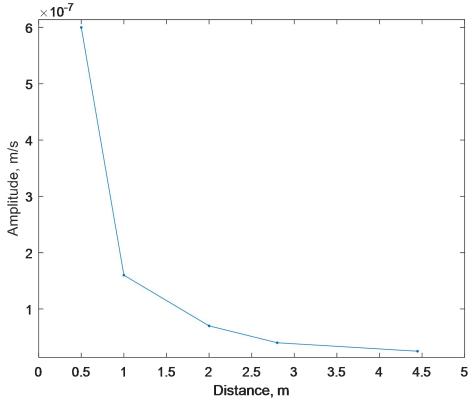
Started collaboration with Astronika

Project 1

- Characterisation of ground devices

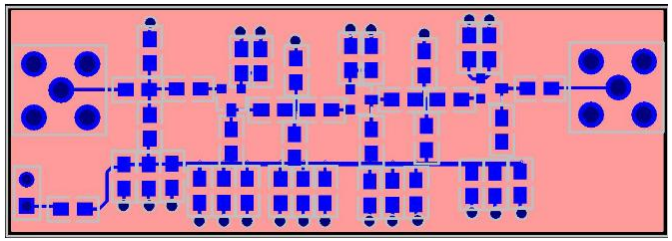
- Pulse decay as a function of distance from the device

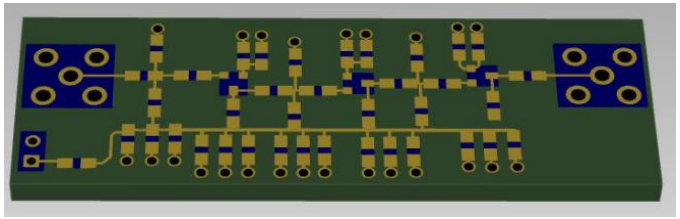




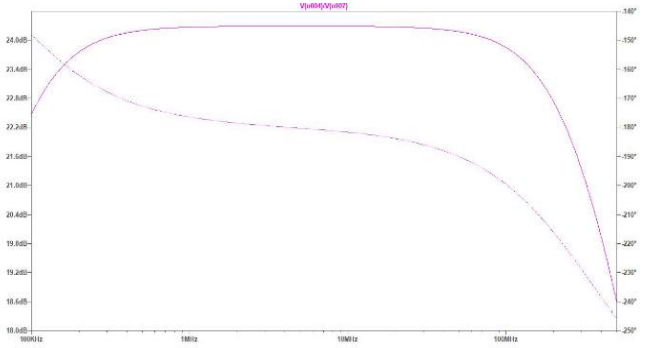
Project 2

- Amplifier for microsatellite



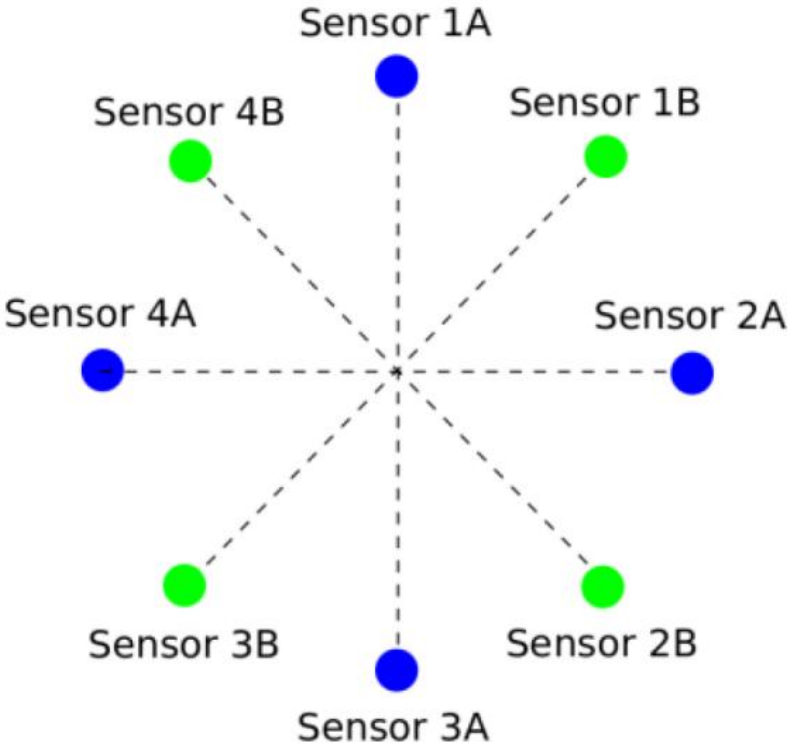


- Frequency response



Infrasound and seismic wind farm characterisation

- The measurements were located near the city of Nasielsk (40 km from Warsaw)
- Eight microphones were deployed on the profile of a circle with a diameter of 12 meters



Achievements

- Grant Miniatura-6 grant, (2022/06/X/ST7/0024) Environmental studies of acoustic disturbances using an array of infrasonic microphones
- 1x M. Suchenek „*Infrasound preamplifier for condenser microphone*” - in review
- 1x co-author „*Clock synchronization for distributed data acquisition systems*” - ready in 99%, authors' proofreading

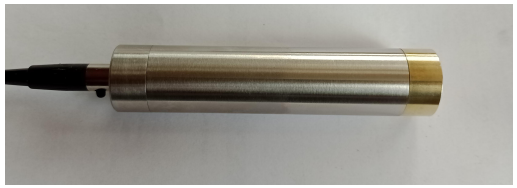
These works are related to the VIRGO collaboration and the development of research instruments for the Einstein Telescope infrastructure

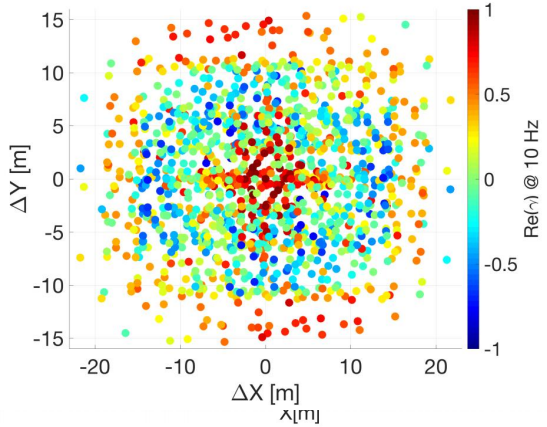
- 1x patent application: M.Suchenek, „Computing platform for robots with the ROS system with reconfigurable machine learning cores based on a programmable FPGA” - UP. RP P.445671, 59P52025PL00, received by the Patent Office 25/07/2023

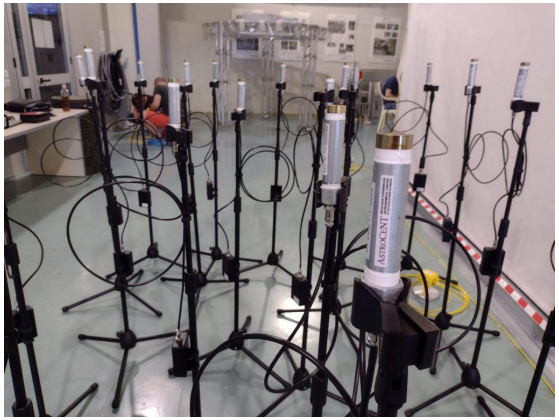
New VIRGO/ET Environmental Sensors

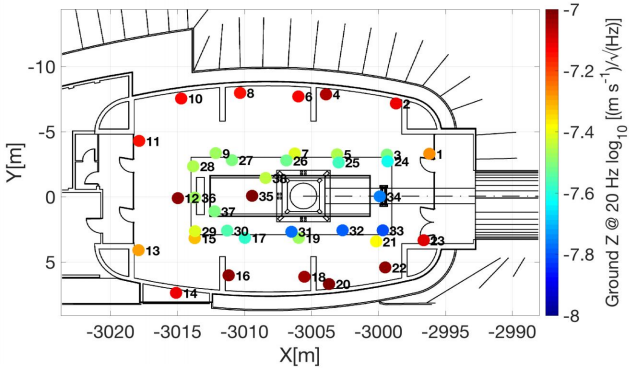
New version of infrasound sensor

- wider frequency range (0.06-300 Hz),
- better sensitivity 2.5 mV/Pa increased to 4 mV/Pa
- better bandwidth and sensitivity repeatability,



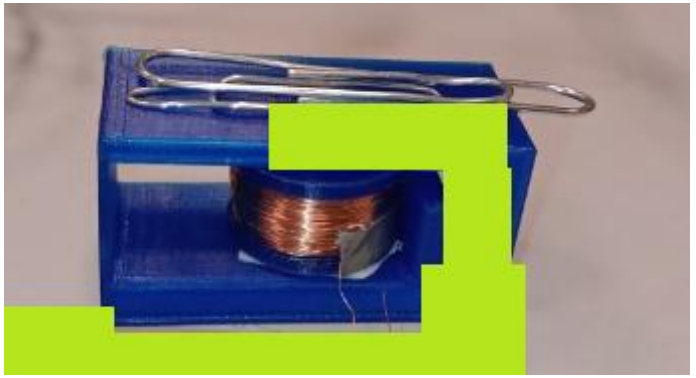


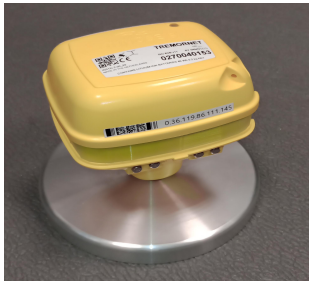




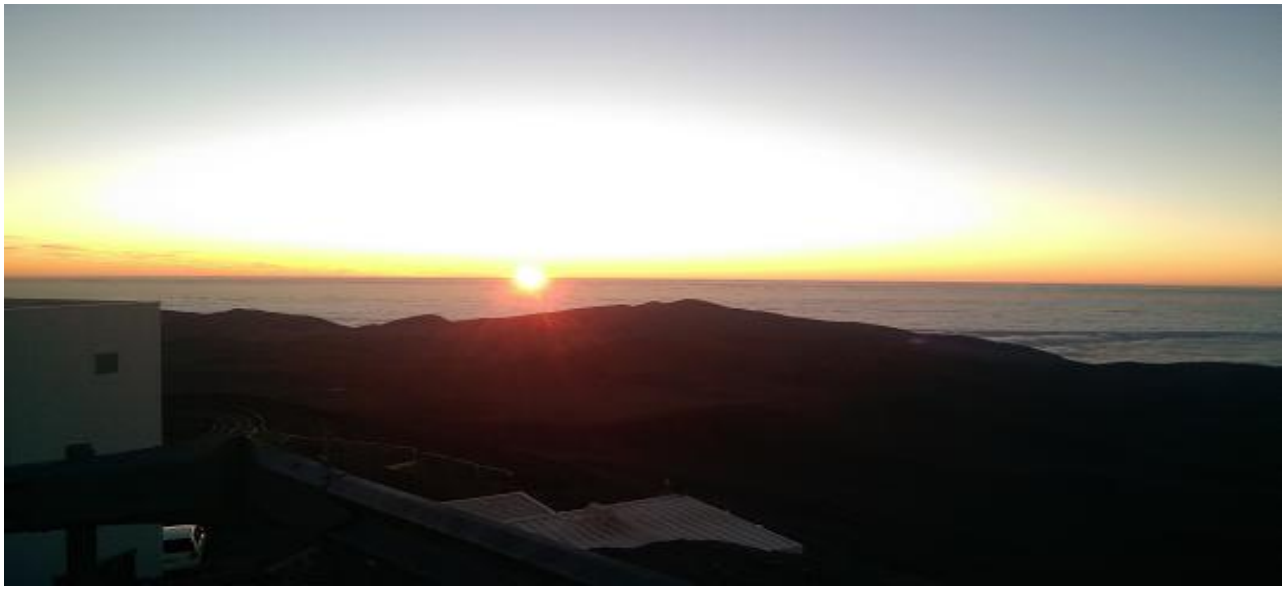
One-dimensional active seismic sensor

- wider frequency range (**0.1 or lower** - ~100 Hz),
- model not a prototype
- fills the space between geophone and professional seismic s in terms of low frequency sensitivity





Thank you for your attention



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