

## About KPI

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” (KPI) was founded in **1898**. Over the period of its existence it has trained **370** thousand of specialists. KPI is one of biggest educational establishments in Europe. It trains **25** thousand of students, postgraduates; doctorates as well as foreign student from neighbouring and far abroad countries.



University has **14** faculties, **11** educational and scientific institutes, several scientific and research institutes and educational centers. It trains Bachelors, Specialists and Masters, PhD and Doctors of Science. It employs more than **500** professors and over **1300** associate professors.

KPI ranks **4%** of the best universities of the world according to the international rating QS and Webometrics. It annually holds the highest positions among the best higher educational establishments of Ukraine – “Compass” and “TOP-200 Ukraine”.

According to Google Corporation, it is the most popular higher educational establishment of Ukraine during the last years.

### KPI mission

To make a significant contribution to sustainable development of society through internalization and integration of education, research and innovation development. To provide conditions for all-round professional, intellectual, social and creative development at the highest levels of excellence in education and research area.



# KPI Team



**Mykhailo Ilchenko**  
academician, professor  
KPI team leader, PPD

## Project Tasks:

- 1.Coordination of joint research with FTMC and IGIC
- 2.analysis of obtained results related to the experiments;
- 3.discussion of the results obtained by other partners involved into the project and participation in preparation of joint articles and other outputs.
- 4.Participation in joint meetings of researches involved into the project.



**Hlib Avdieienko**  
Ph.D, associate professor

## Project tasks:

1. Microwave rectennas design



**Alex Zhivkov**  
Ph.D, associate professor

## Project tasks:

- 1.Metamaterial structures and cells analysis
2. design of 3D metamaterial antenna based on DR for rectennas application



**Igor Trubarov**  
Ph.D, associate professor

## Project tasks:

1. Microwave antennas topologies analysis and design for rectennas

## KPI tasks:

### *WP1 “Management”*

- 1.1 Strategic scientific coordination (with FTMC)
- 1.2 Day-to-day management (with FTMC)

### *WP2 “Development of dielectric resonator rectenna”*

- 2.1 Research for the best dielectric resonator antenna design (with FTMC)

### *WP3. “Dielectric resonator rectenna fabrication and characterization“*

- 3.1 Impedance matching circuits design. Matching and rectifier circuits testing for proposed dielectric resonator antenna (with FTMC)
- 3.3 Testing and characterization of manufactured rectenna (with FTMC)
- 3.4 Electromagnetic field sensor design and testing (with FTMC)

### *WP4. “Dissemination, Public Outreach, Exploitation and Transfer of Knowledge”*

- 4.3 Dissemination and transfer of knowledge



**Ilia Halytsky**  
Young researcher,  
PhD student

## Project tasks:

1. Computer simulation



**Volodymyr Ilchenko**  
Young researcher,  
PhD student

## Project tasks:

1. Computer simulation
2. Manufacturing and testing



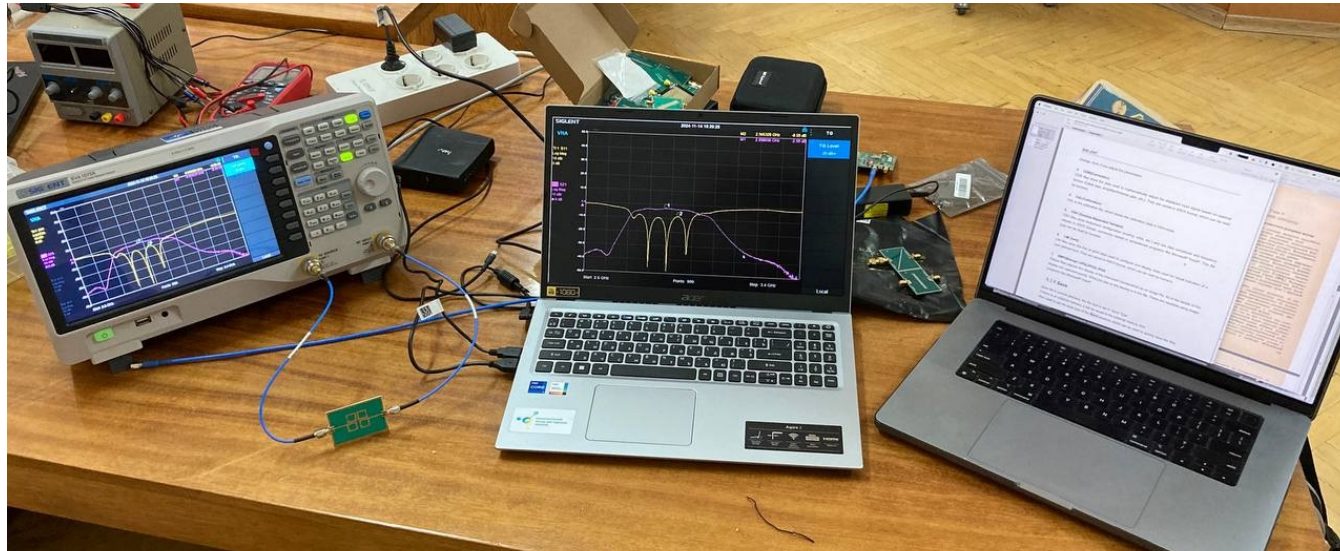
# KPI team tasks in the project

Simulation of new cells of metamaterials, studying their properties and microwave antennas based on the cells of metamaterials for energy harvesting and electromagnetic sensing.

## Available measurement equipment of KPI



# Siglent SVA1075X VNA

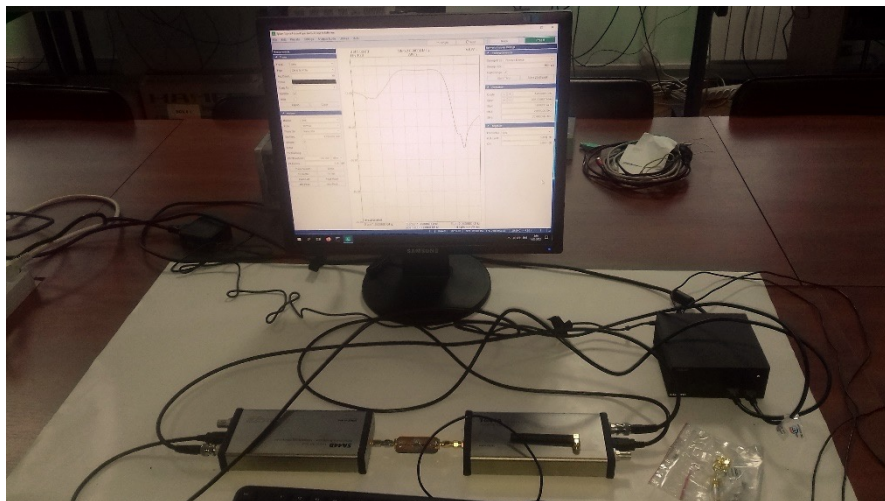


## Key characteristics:

- Frequency range: 9 kHz to 7.5 GHz.
- Minimum Resolution Bandwidth (RBW): 1 Hz (up to ~3 MHz).
- Displayed Average Noise Level (DANL): typically  $-165$  dBm/Hz (normalized to 1 Hz).
- Phase Noise:  $< -98$  dBc/Hz @ 1 GHz, 10 kHz offset (typical).
- Total Amplitude Accuracy (typical):  $< 0.7$  dB.
- Touchscreen Display: 10.1 inch multi-touch (1024×600) with mouse/keyboard support.
- Standard built-in Tracking Generator.
- Built-in Preamplifier (standard) to enhance sensitivity.



# Signal Hound tracking generator TG44A and spectrum analyzer SA44B (up to 4.4 GHz)



## TG44A tracking generator key features:

Operating frequency range : **10 Hz... 4.4 GHz**

Frequency stability:  **$\pm 1$ ppm**

Frequency grid step: **19 options from 10 Hz to 10 MHz**

The amplitude of the output signal is **-30 dBm...-10 dBm**

The accuracy of setting the amplitude is  **$\pm 2$  dB**

Amplitude setting step **1 dB**

Frequency resetting speed 700 counts/s (in combination with USB-SA44B)

The level of spurious oscillations  **$< -10$ dBc**

## SA44B spectrum analyzer key features:

Operating frequency range: **10 Hz... 4.4 GHz**

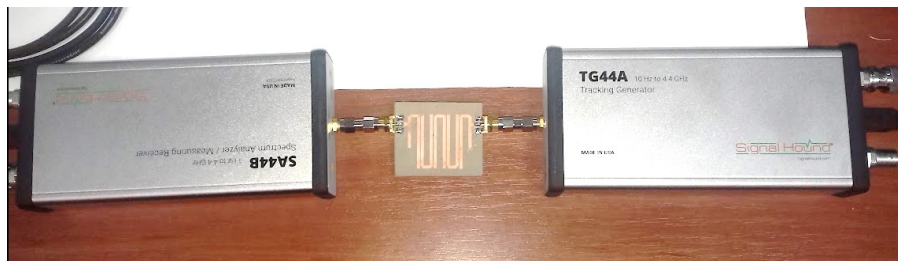
Frequency resolution: **0.1...250 kHz, 5 MHz**

Dynamic range: **-151...+10 dBm**

A low-noise amplifier is available at frequencies  **$> 500$  kHz**

Measuring receiver with a large dynamic range of **0 dBm... -125 dBm (150 kHz - 1 GHz), 0 dBm... -115 dBm (1 GHz – 4.4 GHz)**

The accuracy of measuring the amplitude of AM and FM signals is 1% AM / FM / SSB / CW audio demodulator in real time



# MPI Computing Cluster



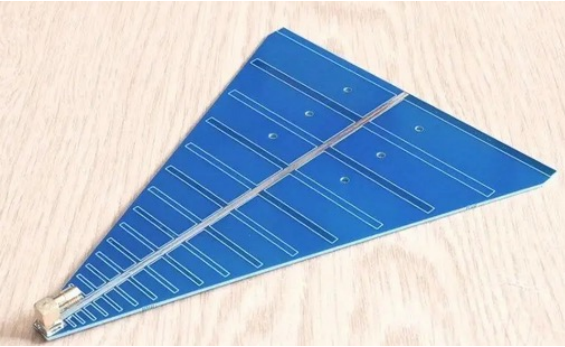
## Entry Level Cluster to speed up FEA simulations

- 1 x 4GHz CPU + 2 x 3GHz CPU
- 128 GB of RAM
- 4TB of SSD for result cache storage
- Infiniband FDR 56Gbps Interconnect
- MPI compatibility
- Support for Parallel and Distributed computing



## Microwave antennas

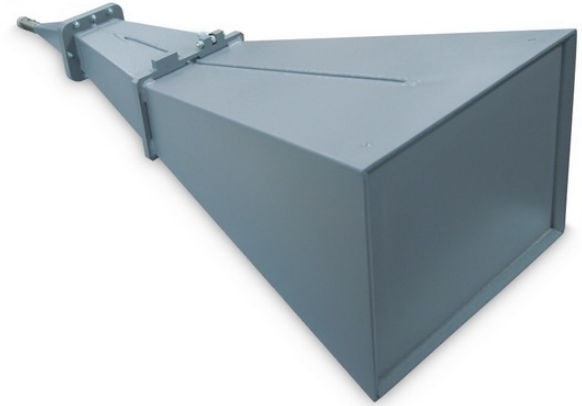
**Log-periodic:** 0,8 – 6 GHz



**Wideband planar:** 0,73 – 6,5 GHz



**Wideband horn:** 0,85 – 17,4 GHz



**Wideband planar:** 1,4 – 10,5 GHz



**Pyramidal horn:** 2 – 5,64 GHz



**Biconical:** 0,6 – 6 GHz

