

# A step closer to conducting top-level research in physics

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Experiments in astrophysics and nuclear and particle physics are crucial

to analyse how the universe works. These usually require complex detector systems whose design and testing necessitate a deep understanding of a variety of topics in physics, electronics and computing. Thanks to the EU-funded PaRaDeSEC project, a research institute in Croatia has taken a major step in strengthening its potential for the development, testing and construction of research equipment for nuclear, particle and astroparticle physics experiments.

According to a news item the Ruđer Bošković Institute (RBI) has recently inaugurated the Centre for Detectors Sensors and Electronics (CDSE) following the completion of the project "Using synergy to achieve excellence in the research and development of detectors sensors and electronics."

Quoted in the same RBI news item, project manager Dr. Neven Soić says: "The project has made it possible to procure a large number of instruments important for research, as well as remodeling laboratories, thus creating controlled conditions of cleanliness, temperature and air humidity, improving the stability of electric systems and reducing the level of electronic noise [so] as to enable the characterization and testing of a new generation of detectors of significantly improved characteristics to those currently used for research in CERN."

The news item emphasises that the activities of the CDSE will also help the project "Open scientific infrastructural platforms for innovative applications in the economy and society" (O-ZIP), which is linked to PaRaDeSEC. "All this will significantly enhance the impact and reputation of the RBI and Croatia in the international scientific community, as well as the participation of the RBI in various internationally funded projects."

## **Key technologies**

The [project website](#) summarises O-ZIP's vision: "The impact on developing a competitive industrial sector will derive from addressing employing and enhancing key enabling technologies (KET) fostering an unheralded interaction between research and industry an active engagement in the emerging Croatian competitiveness clusters and a stimulatory redefinition of the implementation of knowledge transfer activities."

The KETs covered by O-ZIP include "biotechnology (pharmaceutical and food industry) advanced materials and manufacturing technologies (detectors and sensors smart materials radiation technologies) ICT: eScience photonics (optoelectronics) health (diagnostic and therapeutic methods)" as stated on the [O-ZIP project website](#).

The ongoing PaRaDeSEC (Expanding Potential in Particle and Radiation Detectors Sensors and Electronics in Croatia) project was set up to form "a group and facility focused on semiconductor radiation detectors and related data acquisition electronics" at RBI as noted on the project website. These detectors are utilised to conduct "high-energy physics (HEP) experiments [nuclear safety](#) monitoring space missions and in various medical applications. Silicon pixel and microstrip detectors provide very precise spatial resolution while being cost-effective due to well-established semiconductor manufacturing technology."

The project also involves "applications of a new processing technology, Atomic Layer Deposition (ALD), which provides significant potential ... [to] improve the performance of semiconductor detectors. The development of advanced radiation detectors is closely related with scientific activities of [the] RBI Division of Materials Physics having a large variety of characterization and spectroscopy tools for semiconductor materials."

**More information:** PaRaDeSEC project website:

[lnr.irb.hr/PaRaDeSEC/](http://lnr.irb.hr/PaRaDeSEC/)

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