

# Horizon 2020 ERA Chair project

„Expanding Potential in Particle and Radiation Detectors, Sensors and Electronics in Croatia”

## PaRaDeSEC

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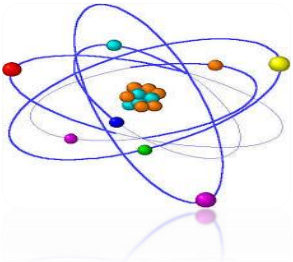
**On the behalf of the PaRaDeSEC Project**



<http://paradesec.irb.hr>



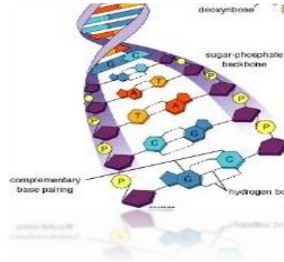
## PHYSICS



## CHEMISTRY



## LIFE SCIENCES



## ENVIRONMENT



## ICT



900 employees of which 360 permanent, 290 Post Doctoral and PhD students

5 % of Croatian  
researchers

~ 50 % of Croatian  
Horizon 2020

15 % of Croatian  
publications

30 % of Croatian  
top publications

### **Mission:**

Excellent science

Strong involvement in higher education

Leading contribution to the growth of the  
national economy

### **Vision:**

Croatian centre of scientific excellence

Recognized research institution at  
international level



## Project objectives

1. To acquire top class researchers for the Center for Detectors, Sensors and Electronics
2. To enhance the experimental role of RBI
3. To enhance capacities of RBI for multi-and inter-disciplinary applications and technology transfer
4. To contribute to the realization of the Croatian Smart Specialization Strategies and take leading role in the institutional changes

**Project funding - 2 434 500 €, total 2 705 000 €**

Aim	Amount €
Staff	1 544 000
Equipment	220 000
Knowledge & experience transfer Education of young researchers	286 000
Other expenses: Dissemination, Communication, Science Popularisation	114 000
Indirect expenses	541 000

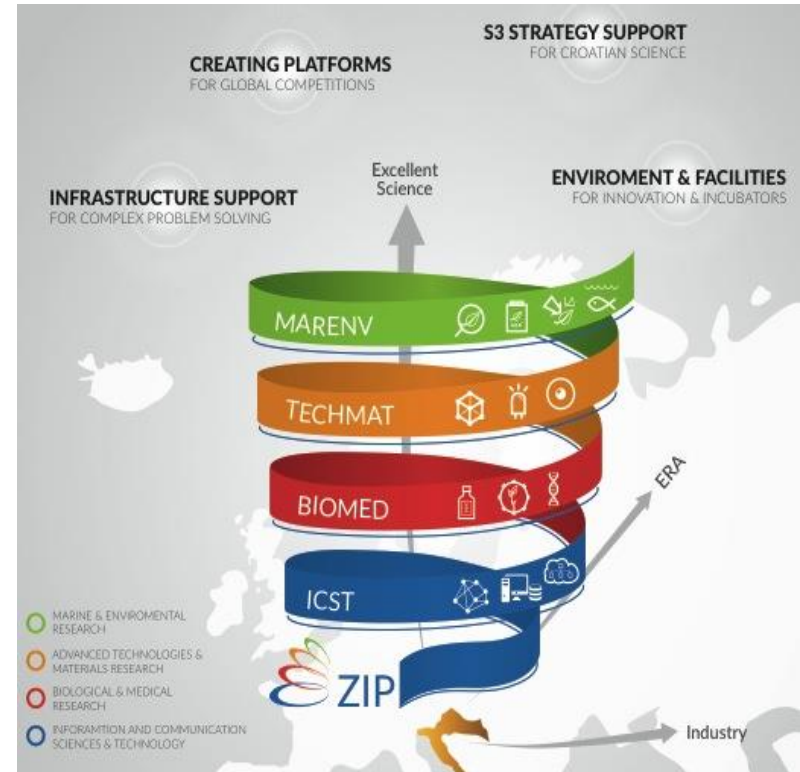


# Open Scientific Infrastructural Platforms for Innovative Applications in the Economy and Society: O-ZIP



**72 million Euro project**  
that will enable Croatian industry to be based on science and innovation

- HR Operational Programme 2014-2020
- Smart Specialisation Strategy



## Current

- RBI+IF scientific Center of excellence for advanced detectors & sensors - **CEMS (5 M€)**
- H2020 project Advanced European Infrastructures for Detectors at Accelerator - **AIDA2**
- H2020 project **EuroFusion** European Consortium for the Development of Fusion Energy (**~850 M €**), RBI is the project partner (**~500 K €**)
- Central European Research Infrastructure Consortium – **CERIC**
- H2020 Twinning project **RBI-T-WINNING** theoretical physics
- NATO SPS project **E-SICURE**

## Past

- The most important FP7 REGPOT project **Particle detectors** - „Upgraded Facility for Development of Silicon and Diamond Particle Detector Systems“ funded by EC with 1.32 M€
- Large number of smaller international projects: IAEA, FP6, FP7





# CDSE - Center for detectors, sensors & electronics



Independent unit collaborating with other organisational units within RBI

National center for development of particle & radiation detectors , sensors for research & applications and associated electronics

CDSE is open facility collaborating with all stakeholders in science, education, national & local administration & industry

Partners: PMF & FER UniZ, IF, all university units in related subjects, high-tech companies

**CDSE enables larger and higher quality utilisation of EU funds from Horizon 2020 and ESIF**

**Deployment**

<http://paradesec.irb.hr>



# What was crucial for the success?

## Excellence

- Good international scientific relevance and reputation
- Well adjusted objectives
- Clear and concise SWOT analysis
- Credible and realistic action plan for structural changes

## Impact

- Well demonstrated enhancement of the RBI capabilities
- Well described positive impact on research level
- Well described contributions to the objectives of national S<sup>3</sup>

## Implementation

- Large experience from previous FP projects
- Effective and properly presented work plan
- Coherence between SWOT analysis and work plan

## European Structural Funds

- Well explained relation with the O-ZIP project & national S3
- Success of the O-ZIP proposal
- Involvement in a number of other proposal for ESF

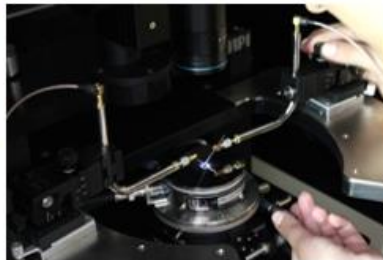
**PaRaDeSEC is not an isolated project, it is an important part of the RBI strategy**



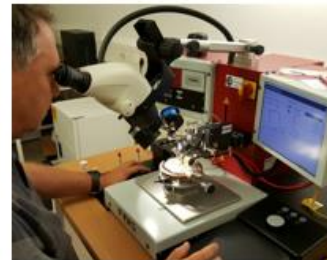
## R&D Infrastructure at the CDSE



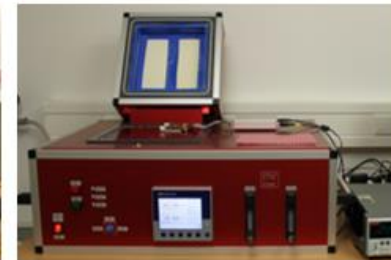
Scanning TCT setup



Probe station



Wire bonder



ColdBox setup

## Legacy Infrastructure

- Accelerator Complex - Largest Experimental Complex in Croatia
- Gamma irradiation facility – 2PBq  $^{60}\text{Co}$
- Neutron generator



6.0 MV EN Tandem Van de Graaff accelerator



1.0 MV HVE Tandetron accelerator



Experimental hall



$^{60}\text{Co}$  irradiation chamber

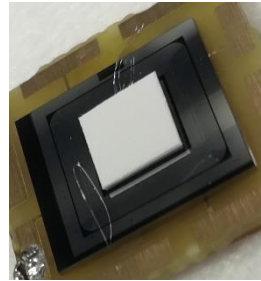
At RBI Material Physics and Chemistry Department  
Large selection of spectroscopic tools (PL, DLTS, Raman etc)



## X-ray detectors for medical imaging and dosimetry

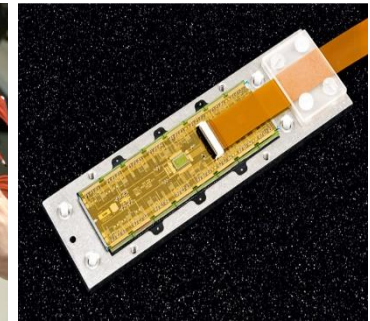
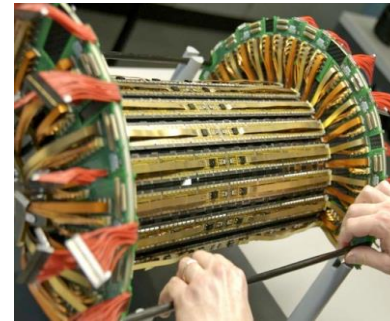


CdTe X-ray pixel detector

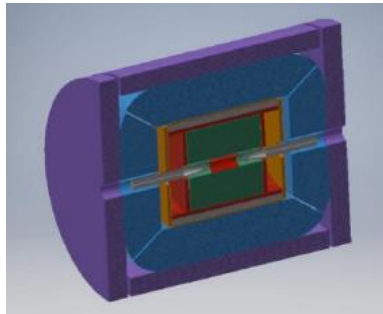


Si + Sci radiation detector

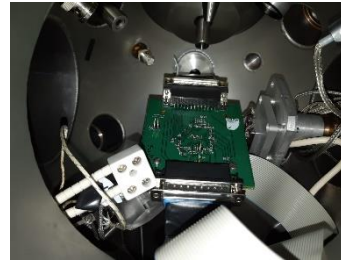
## CMS Pixel modules characterisation and assembly



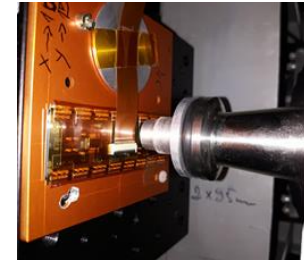
## Next generation calorimeter for IDEA



## Radiation tolerance studies by Beam tests and Radiation sources



RD53A VLSI chip



CMS Pixel Module



RD53A readout chip

## Partners and International Collaborators

- Helsinki Institute of Physics and Micronova Nanofabrication Center, Finland
- Ioffe Polytechnic Institute, France
- Center for Semiconductor Detectors and University of Xiangtan, China
- INFN Bologna, Milano, Pavia, Pisa and Università degli Studi dell'Insubria, Como Campus, Italy
- Paul Scherrer Institute (PSI) and ETH Zurich, Switzerland
- Universidad de Sevilla, Spain
- Multiple research groups in the RD50 and RD53 collaborations at CERN

# Thank you for your attention!



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 669014. The content on this website is the sole responsibility of the RBI and can in no way be taken to reflect the views of the European Union.