



**Introduction to the 2<sup>nd</sup> Workshop  
of the ENSAR2 JRA2 - PSeGe  
(R&D on Position-Sensitive Germanium  
Detectors for Nuclear Structure and  
Applications)**

**A.Gadea (IFIC-Valencia) for the PSeGe Collaboration**

**2<sup>nd</sup> PSeGe Workshop, University of Milan 11<sup>th</sup>-12<sup>th</sup> September 2017**



# ENSAR2 JRA2 – PSeGe Goals:



- The present project will contribute to the R&D of detector technology for position-sensitive HPGe detector arrays. R&D on key areas as detector technology, the basic characteristics of the novel detectors, electronic instrumentation and software developments.
- Collaboration and technology transfer to industry partners welcome and necessary.
- We are strongly committed to the development of new applications especially in the field of high-resolution gamma-ray imaging. The networking activity associated with this JRA is our tool.

## Tasks

- **Task 1: New technologies on passivation and segmentation (INFN-LNL)**
- **Task 2: R&D on novel Ge-detector geometries for ultimate position resolution and efficiency (Coordination GSI)**
- **Task 3: R&D on segmented p-type coaxial detectors (Coordination CSIC)**
- **Task 4: Network activity: Demonstration of imaging applications and associated detector technologies (Uni. Liverpool)**

# **Task 4: Network activity: Demonstration of imaging applications and associated detector technologies (Coord. Uni. Liverpool)**

Network Activity on Position Sensitive Ge Detector Technologies and applications

- Subtask 4.1: Demonstration of imaging applications
- Subtask 4.2: Detector encapsulation techniques
- Subtask 4.3: Low-power pre-amplifiers & cryostat R&D / BSD, HV, LV distribution
- Subtask 4.4: Pulse-Shape Analysis and neutron-gamma discrimination

## **PSeGe funding**

- Personnel (~6 men/year)
- 84 k€ for organization of Workshops and meetings

## **PSeGe Web Site**

- <http://psege.lnl.infn.it/>,

Only a kick-off for the R&D on detectors collaboration and extra efforts welcome!

# PSeGe Organization:



- Coordinators A.Gadea, D.R.Napoli, P.Reiter
- Management board: A.Boston (Uni.Liverpool), G.Duchêne (CNRS), A.Gadea (IFIC-CSIC), J.Gerl (GSI), D.R.Napoli (INFN-LNL), P.Reiter (IKP-Köln). G.Duchêne (IPHC).
- General Assembly with representatives of institutions participating and associated: CSIC (IFIC, CNM), INFN(LNL, Milano), University of Cologne, GSI, University of Liverpool, CNRS, CEA, KTH, University of Uppsala, University of Milan, STFC, University of Salamanca, University of Valencia, ELI-NP.

# Workshop Programme:



## Monday Afternoon:

- New technologies on passivation and segmentation and R&D on segmented p-type coaxial detectors

## Tuesday Morning

- R&D on novel Ge-detector geometries for ultimate position resolution and efficiency
- Demonstration of imaging and associated detector technologies

## Tuesday Afternoon

- Demonstration of imaging and associated detector technologies
- Concluding remarks and General Assembly



**Thanks' to the University of Milano and INFN Milano for the Local Organization and to all you for participating**





## PSeGeTasks:

Task 1: New technologies on passivation and segmentation – INFN, Uni. Padova, UCO

Task 2: R&D on novel Ge-detector geometries for ultimate position resolution and efficiency  
GSI

Task 3: R&D on segmented p-type coaxial detectors

CSIC-IFIC, INFN-LNL, Uni. Padova, CSIC-CNM

Task 4: Network activity: Demonstration of imaging applications and associated detector technologies – ULIV, CNRS, KTH, INFN, USAL, CSIC, UCO, UMIL, IFIN-HH

## •Deliverables (2016)

- MS10.1: Kick-off R&D Meeting: Completed in Q2 2016, Reported Feb. 2017
- MS10.2: 1<sup>st</sup> Detector R&D Application / associated technologies workshop: Completed in Q4 2016, Reported in Feb. 2017

## •Deliverable (2017)

- MS10.3: 2<sup>nd</sup> Detector R&D Application / associated technologies workshop: Announced for 11<sup>th</sup>-12<sup>th</sup> September 2017, Organization Ongoing

**Status:****•Task 1: New technologies on passivation and segmentation**

- Contract assigned to INFN ongoing (Walter Rainiero) since 3/11/2016
- Done the first test of implantation of Boron in planar detectors to produce new contact technologies
- Now working in the preparation of a coaxial detector from a raw Ge-HP crystal in order to check the new contact technology in quasi-coaxial detectors.
- The contract for a post doc position in IKP-Cologne is assigned (Herbert Hess) starting from 1.12.2016. Funds will be used until 31.8.2018
- Development new encapsulation techniques ongoing at IKP-Cologne.
- Cryostat development is ongoing for new detector prototypes in collaboration between IKP-Cologne and INFN.

**•Task 3: R&D on segmented p-type coaxial detectors**

- Under consideration the use of Phosphorous for dopant diffusion and activation for the junction formation.
- Collaboration established with the Micro electronics group of the University of Padova, Italy
- Ongoing the formalities of the contract for a Post-Doctoral collaborator.

**Status:****•Task 4: Demonstration of imaging applications and associated detector technologies**

- Ongoing the 2<sup>nd</sup> workshop on Detector R&D, Applications and associated technologies.
- IKP-Cologne is contributing to the developments with the work of a master student (Rouven Hirsch) working on gamma ray imaging with two different position sensitive HPGe detectors: a cylindrical coaxial detector, and tapered AGATA detector both 36 fold segmented. This work performed in collaboration with University of Liverpool.