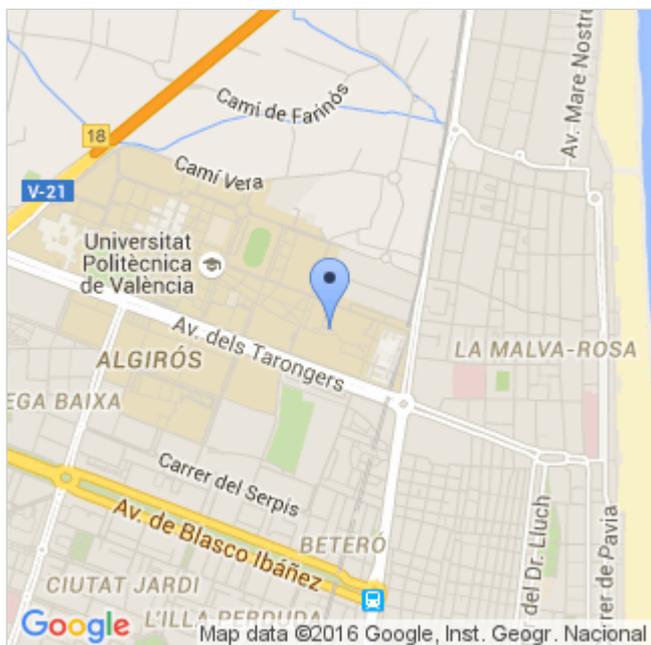# Expression of Interest

Contact Person/Scientist in Charge

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Universitat Politècnica de València (UPV)

Department / Institute / Centre

- **Name:** PET detector group at i3M (Institute for Instrumentation in Molecular Imaging) - Universitat Politècnica de València
- **Address:** Campus de Vera; Camino de Vera, s/n; Valencia (46022)
- **Province:** Valencia

Research Area

- Life Sciences (LIF)
- Physics (PHY)

Brief description of the institution:

Universitat Politècnica de València (UPV) is the single Spanish Technical University that features in the main University world rankings. It is within the top 5 Spanish Universities with the highest revenue from both public research and knowledge transfer activities, and a national leader in patent license income and start up creation. Constituted in 1971, it comprises nearly 30.000 students, over 2500 academics, and 17 university research centres of excellence.

UPV has a relevant experience in the participation in international research programmes, with over 100 FP7 projects and 40 H2020 projects in the period 2014-2015. UPV researchers are also actively involved all H2020 life program stages, from workprogramme drafting discussions, to project coordination. It is also taking part in several major partnering initiatives (JTIs, PPPs, KICs…).

Brief description of the Centre/Research Group (including URL if applicable):

The i3M, institute of CSIC-UPV, has over 15 years of experience in sensors and systems for medical imaging. The group has developed several PET and SPECT systems for biomedical studies with small animals, with innovative and patented designs that have been successfully transferred to the industry. Most recently, it has developed a PET mammograph of excellent resolution (bellow 2mm), within the framework of the EU project MAMMI (Mammography with Molecular Imaging-FP6-2005-LIFESCIHEALTH-7-037555). This project is been presented as a success story by the European Commission. Currently, is coordinating another EU effort on the FP7 called MindView on the development of a brain PET insert for up to 3T MRI. There are several divisions, one of them works on new developments on gamma ray detectors such as for PET (Positron Emission Tomography).

Project description:

New developments on PET detectors with high performance capabilities, especially focussed on sub 300 ps timing resolution.

Current PET systems developments typically lack of high timing resolution. In some scanners, especially those with limited angle tomography, good timing capabilities will help recovering very good spatial resolution. The signal to noise ratio increases when accurate timing information is considered in the reconstruction process. Our team has developed high performance detector blocks that are commercially available as small animal PET systems (Bruker) or in prototypes as in the dedicated brain PET insert for MRI under the MindView project. Today, these systems reached a timing resolution nearing 1.5 ns and it is the aim of the team to improve the timing capabilities of these systems well below 500 ps CRT.

This project aims to implement novel electronics for PET instrumentation, most likely based on application specific integrated circuits. The project might be the particular developments of these chips or the implementation of currently available technology into our systems. Synchronizing several of these chips seems to be a tough work at the given timing resolution. This project also aims using our current monolithic scintillation crystal technology. There are not, to our knowledge, scanners with high timing capabilities yet based on this type of crystals.

Applications

CV, letter of motivation, letter of recommendation.