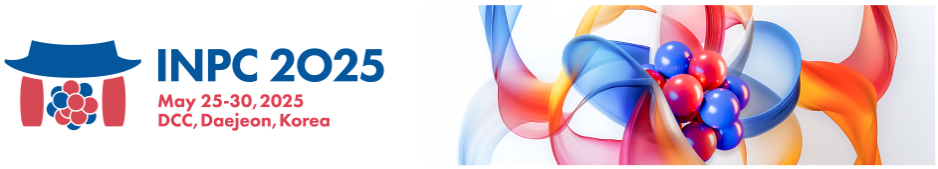

Contribution ID: **94** Type: **Contributed Oral Presentation**

Radioisotopes for monitoring the effects of Climate Change on marine Ecosystems: the REMO/ClimOcean project at SPES/LNL RIB facility

Thursday, 29 May 2025 17:35 (15 minutes)

Radioisotopes for monitoring the effects of Climate Change on marine Ecosystems: the REMO/ClimOcean project at SPES/LNL RIB facility

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Since the beginning of the industrial revolution, oceans have absorbed about one-third of the carbon dioxide (CO2) released by human activities [1]. This release results in ocean acidification, often referred to as "the other CO2 problem", along with global warming [2]. Ocean acidification is a change in the pH of seawater; CO2 reacts with water molecules (H2O) and forms the weak acid H2CO3 (carbonic acid). It is estimated that if CO2 continues to be released at the same rate as it is today, the acidity of the ocean will increase by 170% compared to pre-industrial levels. Changes are happening at least 10 times faster than at any time in the geological past. A precise knowledge of the influence of the acidity of the waters on the rates of primary production, growth and calcification of some marine species is essential for the risk assessment of coastal ecosystems, the management of the stock of commercial species and to understand the responses of organisms to changes in pH. Considering growth and the blue economy as key issues, acidification also has the potential to affect food security and ecosystem integrity [3]. As coral and bivalve molluscs build their exoskeletons and shells respectively through the production of calcium carbonate (CaCO3), the influence of seawater acidification on the calcium uptake of these organisms can be studied using calcium radiotracers (41,45Ca) in projected acidity conditions [4,5]. The REMO/ClimOcean (Radiotrazadores para el estudio de Ecosistemas Marinos y Oceánicos (Spain)/CLIMate change and OCEAN acidification (Italy)) project focuses on the study of marine species heavily impacted by acidification. The aim is monitoring, non-destructively, the calcium uptake, and therefore the growth, in various corals and bivalve species. In this way, the same individual and the entire colony can be evaluated at any stage of the life-cycle. The non-destructive techniques, without impacting on the animal, represent a technological challenge from the nuclear experimental standpoint. This cross-disciplinary project is possible due to the joint efforts of biologists and nuclear physicists, combining expertise from the Valencia Oceanogràfic (E), the Hydro-biological station of the University of Padova (I), the Instituto de Física Corpuscular (E) and the INFN-Legnaro National Laboratories (I). The status of the project and the results of the first measurements performed at the Oceanogràfic and Hydro-biological station will be presented, together with the programs for production of novel radiotracers at the SPES facility of the Legnaro National Laboratories (I).

This study is part of the PRIN 20229J3XN CUP 153D23005750001 PE2 and ThinkInAzul supported by MIUR (I) and MCIN (E) with funding from European Union NextGenerationEU (PRTR-C17.I1) and by Generalitat Valenciana project GVATHINKINAZUL/2021/036.

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Presenter: DE ANGELIS, Giacomo (INFN Laboratori Nazionali di Legnaro)

Session Classification: Parallel Session

Track Classification: Applications Based on Nuclear Physics