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#7-82 The integration of a neutron induced activation module in the Monte Carlo calculation code RayXpert® as part of the Simβ-AD project

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One of the key challenges in cyclotron infrastructures is the accurate determination of nuclear isotopes inventory, both for radiation protection studies and decommissioning. Indeed, radioactive waste management during the operation and dismantling of cyclotron facilities is a highly demanding process. Until now, radionuclides inventories can be carried out using several software, such as the combination of a Monte Carlo calculation code and an activation software, coupled with other resource-intensive procedures, including administrative, financial processes or radiological characterization.

The Simβ-AD consortium aims to develop and prove the feasibility of a methodology for assessing the activation of cyclotrons, and in particular pure β-emitters, difficult to detect. As part of the project, TRAD Tests & Radiations has developed a neutron-induced activation module in the 3D Monte Carlo calculation code RayXpert® that will be used to compare real-time measurements. The latter is a software designed for a wide range of applications in the nuclear, medical and industrial sectors. It is especially used in radiation protection in order to optimize shielding designs for facilities using ionizing sources.

In this presentation, the Simβ-AD project, driven by iRSD and IPHC instances of CNRS, IBA and TRAD, will be first introduced in order to understand all the resources deployed to optimize radioactive waste management. Then, the steps involved in integrating the neutron-induced activation module into RayXpert® will be discussed. This section will include a presentation of the software and highlights one of its main features, its CAD interface, which helps a great deal for modelling complex cyclotron facilities.

Finally, a comparison between several Monte Carlo calculation codes and experimental results of proton and neutron fluences will be presented. Based on these results, radionuclide inventories calculated with RayXpert® and others calculation codes coupled with an activation software will be compared as part of the validation of the development of the neutron induced activation module.

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