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Feasibility evaluation of nuclear fuel homogeneity control with Liquid Xenon Medical Imaging System

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The non-destructive control and imaging with γ-rays is well-known and is widely used in medicine and in nuclear industry. The forthcoming presentation is centered on new application of a state-of-the-art detector, based on a LXe single-phase 24-cm long field-of-view (FOV) camera, XEMIS2. It is constructed in Nantes, France, and is currently undergoing its testing phase. Originally conceived for medical 3γ-imaging, the camera is now being scrutinized to explore additional area of its'application in non-destructive control and imaging of high-density (> 10 g/cm2) objects that emit a wider spectrum of γ-rays, which is a quite relevant and ambitious goal [1,2]. It was shown that for medicine purposes it can work with relatively small activities [3] to produce images using γ-rays. High activity is expected for dense and emitting objects containing U or Pu isotopes, but the useful high-energy region of interest for high-density in-depth scan presents a challenge due to small statistics.

The talk will expound on the different methods being developed and assessed for such sources control. Notwithstanding the challenges of density and statistics of the measured objects, XEMIS2 holds the potential to unveil imaging and control capabilities in this new application thanks to its'large FOV, unique design features and LXe properties.

References

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