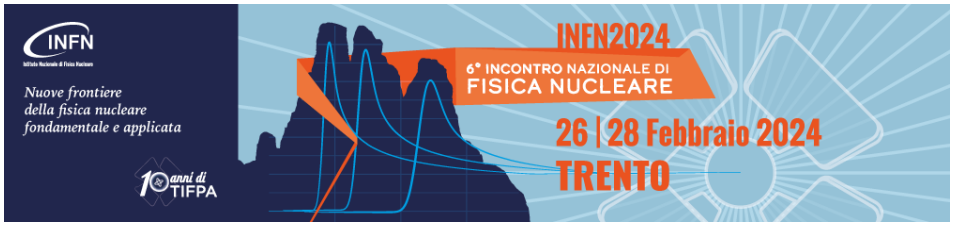

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Cross-section measurements of different reactions leading to the production of 155Tb for medical applications

Wednesday, February 28, 2024 12:50 PM (5 minutes)

Four of the terbium radioisotopes have great potential as theranostic radionuclides (^{149}Tb, ^{152}Tb, ^{155}Tb, and ^{161}Tb). This work mainly focuses on ^{155}Tb (I_{ec} = 100%, $T_{1/2}$ = 5.32 d). It emits gamma rays with energies suitable for SPECT studies (86 keV, 105 keV) and the absence of β^+/ β^- emissions reduces the radiotoxicity of this radionuclide. The effectiveness of ^{155}Tb for the diagnostic in nuclear medicine has been preclinically proved.
In the framework of the INFN REMIX project, our research involves the measurement of ^{nat}Eu(α,x)^{155}Tb nuclear reaction cross-section, alongside with the ones of contaminants prevalent in the process. Moreover, we showcase the viability of indirect production through the generator method - ^{155}Dy/^{155}Tb. This entails the proton-induced nuclear reactions on terbium targets to produce ^{155}Dy, with the cross-section of the reaction ^{159}Tb(p,5n)^{155}Dy experimentally measured.
This presentation provides the results of the measurement of nuclear cross sections, offering a comprehensive comparison of the two production techniques with a keen focus on radionuclidic purity (RNP) and specific activity (A_S).
Our findings not only advance the knowledge about the production pathways of ^{155}Tb for theranostic applications but also contribute to the understanding of nuclear processes by enriching the nuclear libraries.

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