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Study of shell evolution around the doubly magic 208Pb, via multi-nucleon transfer reaction

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The shell model nowadays can provide a comprehensive view of the atomic nucleus along the Segré chart. In fact, the regions around double-shell closures are a fantastic benchmark for nuclear structure studies, since they provide a direct source of information on the nucleon-nucleon effective interaction. A case of great interest is the study of the east region around the doubly magic ^{208}Pb, in fact it represents an ideal testing ground to understand the effects related to the effective three-body forces and the prospect of the state-of-the-art realistic shell-model calculations for heavy nuclei [1].

However, this region has been traditionally difficult to access experimentally due to its neutron richness and low cross sections. Although, it has been investigated using different techniques like fission, deep-inelastic and transfer reaction [2-4], all of them with stable beams. Even with the recent instrumental improvements and the new facilities, we still have a lack of information around this region.

On the other hand, Multi-Nucleon Transfer (MNT) reactions have proved to be an important tool in order to investigate exotic nuclei with stable beams in the region of interest [5]. With this technique, it is possible to excite yrast and close to the yrast states, to understand the different band structures of a nucleus and to investigate possible isomers and/or short-lived states. In addition, in one experiment it is possible to investigate several nuclei at the same time.

With this aim, a MNT experiment with a high intensity radioactive ion beam (RIB) was carried out in September 2017, at the ISOLDE facility. Several isotopes, in the south-east region of ^{208}Pb, were produced during the experiment, using a radioactive ^{94}Rb beam impinging on a ^{208}Pb target. As a consequence, different isotopes around the south-east region of ^{208}Pb were populated. An overview of all the nuclei produced will be reported and, for the cases where the statistic is enough, the level scheme will be constructed and if there are isomers, the lifetime will be calculated

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