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# Highlights from the rst transfer experiment at GANIL with ACTAR TPC

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Direct reactions are fundamental tools to investigate the structure of exotic nuclei. Studies of nuclei far away from stability are usually performed with secondary radioactive beams, that su er from low intensities and need to be compensated with thick targets and high e cient detection systems to increase luminosity. Active targets are invaluable devices that, among other important features, allow to reconstruct the reaction in three dimensions without loss of resolution.

The ACtive TArget and Time Projection Chamber (ACTAR TPC) detector [1,3] has been developed at GANIL to cover a broad physics programme. The device was commissioned in 2018 showing an excellent performance of the detector [4]. Since then, several experiments have been performed at GANIL. In this talk, I will present the results from the single-proton removal reaction 20O(d,3He)19N which aimed at probing the Z=6 shell gap towards the neutron dripline. From all the magic numbers that emerge as a consequence of the spin-orbit splitting, the gaps at 6 and 14, were already considered by Goepper-Mayer and Jensen as very weak [5]. However, experimental results published in Nature [6] showed evidence for a Z=6 shell closure. A (p,2p) experiment [7] was performed later and supports a moderate reduction of the 1p1=2 and 1p3=2 splitting. Yet not direct measurement of the gap has been obtained so far.

The goal of the 20O(d,3He)19N [8] experiment at GANIL is twofold: First, the experiment will provide a unique way of determining the gap between the 1p1=2 and 1p3=2 single-particle states in 19N and will bring crucial information on the Z=6 shell gap. Second, this experiment is the rst transfer experiment with the new generation of active targets. Originally, these transfer experiments required the use of complex arrays for particle and gamma detection systems to improve selectivity. The use of active targets overcomes the aforementioned di culties and is specially well adapted to explore new regions of the nuclear chart with unprecedented resolution using a much more compact detection system.

References

[1] T. Roger et al. Nucl. Instrum. Meth. Phys. Res. A 895, 126 (2018).
[2] J. Pancin et al. Nucl. Instrum. Meth. Phys. Res. A 735, 532 (2014).
[3] P. Konczykowski et al., Nucl. Instrum. Meth. Phys. Res. A 927, 125 (2019).
[4] B. Mauss et al. Nucl. Instrum. Meth. Phys. Res. A 940, 498 (2019).
[5] M. Goeppert Mayer, Nobel Lectures, Physics, 2037 (1963).
[6] D. T. Tran, H. J. Ong et al., Nature communications 9 (2018) 1594
[7] I. Syndikus et al., Phys. Lett. B 809 (2020) 135748
[8] J. Lois-Fuentes, Ph. D. USC (2023)

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