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Experimental and computational evaluation of Alpha particle production from Laser-driven proton-boron nuclear reaction in hole-boring scheme

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Most of the previous studies [1,2,3] on laser-driven proton-boron nuclear reactions are based on the measurement of α-particles with Solid-State Nuclear Track Detectors (CR-39). However, the interpretation of CR-39 results is difficult due to the presence of several other accelerated particles, which can bias the analysis [4]. Furthermore, in some laser irradiation geometries, cross-checking measurements are almost impossible. In this context, numerical simulations may play an important role in guiding the analysis of experimental results.

In this study, we analyze the data from the same experimental campaign, exploiting different laser irradiation schemes (pitcher-catcher and direct irradiation) but the same laser parameters. Different mechanisms are responsible for the acceleration of protons: TNSA in the case of the pitcher-catcher, and hole boring in the case of direct irradiation. Numerical simulations, validated in the pitcher-catcher geometry, have allowed us to obtain conclusive results on laser-driven proton-boron reactions also in the direct-irradiation geometry.

References
[1] D. Margarone, et al., Applied Sciences, 12, 1444 (2022)
[2] J. Bonvalet, et al., Physical Review E, 103, 053202 (2021)
[3] A. Picciotto, et al., Physical Review X, 4, 031030 (2014)
[4] F. Consoli, et al., Frontier in Physics, 8 (2020)

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