Neutron-rich light-nuclei studied via reactions with the ^{9}Li beam *

M. Sigmund[1], N. Soić[1], M. Alcorta Moreno[2], J. Bishop[3], A. D. Brooks[3], L. E. Charón García[2], T. Davinson[4], A. Di Pietro[5], D. Dell'Aquila[6,7], F. Falezza[3], M. Freer[3], I. Gašparić[1], D. Jelavić Malenica[1], T. Kokalova Wheldon[3], M. La Cognata[5], A. Lennarz[2], I. Lihtar[1], I. Martel Bravo[8], M. Milin[9], C. Müller Gatermann[10], S. Murillo Morales[2], C. Parker[11], S. H. Pirrie[3], L. Redigolo[12], B. Reed[2,13], M. Sferazza[14], R. Smith[15], A. Teigelhoefer[2], O. Tindle[15], and N. Vukman[1,16,17]

[1] *Ruđer Bošković Institute, Zagreb, Croatia*
[2] *TRIUMF, Vancouver, BC, Canada*
[3] *University of Birmingham, Birmingham, UK*
[4] *University of Edinburgh, Edinburgh, UK*
[5] *INFN-LNS, Catania, Italy*
[6] *INFN - Sezione di Napoli, Naples, Italy*
[7] *Universita degli Studi di Napoli "Federico II", Naples, Italy*
[8] *University of Huelva, Huelva, Spain*
[9] *University of Zagreb, Zagreb, Croatia*
[10] *Argonne National Laboratory, Lemont, IL, USA*
[11] *Ohio University, Athens, OH USA*
[12] *University of Catania, Catania, Italy*
[13] *St. Mary's University, Nova Scotia, Halifax, Canada*
[14] *Université Libre de Bruxelles, Bruxelles, Belgium*
[15] *Sheffield Hallam University, Sheffield, UK*
[16] *INFN - Sezione di Perugia, Perugia, Italy and*
[17] *University of Split, Split, Croatia*

The broad range of structural phenomena in neutron-rich light nuclei has made them the subject of many experimental and theoretical studies. Despite significant advances in radioactive beam technologies, the nuclear reactions with the neutron-rich nucleus ^{9}Li have not yet been extensively studied [1, 2]. To date, only a few measurements of elastic scattering are available [3-5], highlighting the need for new studies and high-quality measurements of reactions with this exotic beam.
In two experimental campaigns, conducted in 2023 and 2024 at the TRIUMF ISAC-II accelerator facility, the reactions of the high-purity ^{9}Li beam (E = 8.31 MeV/u, intensity up to 10^7 pps) on the boron target with aluminum backing were measured. The campaigns aimed to study the structure of the neutron-rich light nuclei, from Helium to Carbon isotopes, as well as the reactions with the ^{9}Li beam.
Thanks to a employed high-resolution silicon detector array, various transfer reactions were measured together with well-separated elastic and inelastic scattering channels. This enabled a measurement of ^{9}Li elastic scattering on B and Al targets, which will be presented and compared with the published results. In addition, preliminary results from inelastic channels of ^{9}Li scattering and transfer reactions producing ^{10}Be will be presented. These results will advance the understanding of the nuclear structure of ^{9}Li and ^{10}Be.

[1] J.J. Kolata *et al.*, Eur. Phys. J. A **52** (2016) 123.
[2] N. Keeley *et al.*, Prog. Part. Nucl. Phys. **63** (2009) 396-447.
[3] M. Zahar *et al.*, Phys. Rev. C **54** (1996) 1262.
[4] D. Peterson *et al.*, Phys. Rev. C **67** (2003) 014601.
[5] M. Cubero *et al.*, Phys. Rev. Lett. **109** (2012) 262701.

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