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Towards a photo-cathode driven electron-impact ion source for new molecular beams at ISOLDE – Numerical simulations of the ion extraction

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The thick-target ISOL (Isotope mass Separation OnLine) method provides beams of more than 1000 radionuclides of 74 elements. The method is optimized for operation at high temperatures of up to ca. 2000 C. Recently, an interest in radioactive molecules, e.g., for the study of Beyond Standard Model physics was emerging [1]. However, promising candidates (like RaOH) are expected to decompose at these ultrahigh temperatures. While cold target concepts have already been proposed [2], the normal mode of operation of the typically used VADIS (Versatile Arc Discharge Ion Source) with a hot cathode [3] to provide electrons by thermal emission is not well suited. As complementary approach to molecule formation in traps and ion guides [4], we have conducted first exploratory experiments with a photo-cathode driven ion source that exploits electron-impact ionization at ambient temperature [5,6]. Following the promising results, we have started to systematically model the ion source by numerical simulations and compare with the experimentally obtained characteristics. In this contribution, we present first simulation results that allow gaining further insight into the performance of the ion source and support the development of a dedicated prototype.

[1] N.R. Hutzler et al. (2020), 10.48550/ARXIV.2010.08709
[2] J. P. Ramos et al., NIM B, 2016, 376, 81.
[3] L. Penescu et al., RSI, 2010, 81, 02A906
[4] M. Fan et al., PRL, 2021, 126, 023002
[5] J. Ballof et al., EPJA, 2022, 58, 94
[6] J. Ballof et al., J. Phys.: Conf. Ser. 2022, 2244 012072

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