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The New Research Injection Line at the André E. Lalonde AMS Laboratory, University of Ottawa

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In Accelerator Mass Spectrometry (AMS), research into new analytical technologies, the development of new applications, as well as the improvement of existing techniques frequently requires extensive experimental time using ion sources and their associated low energy analytical equipment. To support our research and development program at the André E. Lalonde AMS Laboratory, we are completing a second injection line, which can be connected through to the accelerator and the high energy analysis and detector systems when required. However, it can also be used on a stand-alone basis for low energy experimental work while production analytical work continues on the original injection line. The new line will incorporate two ion sources: one a duplicate of the source on the original line and a second, an upgrade of the SIMS (secondary ion mass spectrometry) source that was used at IsoTrace in Toronto. Either of the sources can be switched into the remainder of the injection line through an electric analyzer with plates that can be rotated, without breaking vacuum, to accept the beam from either source. This analyzer is followed by a 90° magnet with the ability to use electric switching to select nearby isotopes of the element of interest. The magnet is followed by a beam diagnostic box and space for the integration of a pre-commercial version of the Isobar Separator for Anions (ISA)[1]. The ISA[2] uses ion-gas collisions to preferentially remove unwanted isobars while transmitting the isotope of interest; the eV level energies necessary for these interactions require the use of radio-frequency quadrupole ion guides to reduce the effects of scattering and space charge. Following the ISA location are further beam conditioning elements and a 45° magnet for beam analysis during stand-alone operation. In addition to the development work on the ISA, this line will be used for research into improved and new ion source technology.

As an example of work that will be done on this line, data obtained using an earlier version of the ISA to separate the isobars Yttrium and Zirconium for the analysis of Strontium will be discussed. More recent work on the development of suitable ion source materials for the analysis of 90Sr will also be presented.

1. Designed and built by Isobarex Corp, Bolton, Ontario - J-F Alary, G. Javahery, W. Kieser, X-L Zhao, A.E. Litherland L. Cousins, C. Charles Isobar Separator for Anions: Current Status, Nuclear Instruments and Methods B 361 (2015) 197-200
2. A.E. Litherland, I. Tomski, X.-L. Zhao, L. M. Cousins, J.P. Doupé, G. Javahery, W.E. Kieser, Isobar separation at very low energy for AMS, Nuclear Instruments and Methods B 259 (2007) 230-235

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