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# (G*) Negative Ion Source Development for Accelerator Mass Spectrometry

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Negative Ion Source Development for Accelerator Mass Spectrometry
CJ Tiessen, WE Kieser, and XL Zhao
Accelerator mass spectrometry (AMS) is a highly sensitive technique used for the analysis of long-lived radioisotopes. While carbon-14 dating is the most well known application, AMS can be used to measure other isotopes such as beryllium-10, aluminum-26, iodine-129, and uranium-236 which are useful in geology, archeology, environmental tracer and chronology studies, nuclear waste monitoring, and nuclear forensics. The technique uses a combination of electrostatic analyzers, mass-separation magnets, electrostatic lenses, as well as a tandem accelerator. In the accelerator, an electron stripping gas canal is used to convert incoming negative ions to positive ions while simultaneously disintegrating molecular isobars. Ions from the samples are injected into the accelerator using a cesium sputter negative-ion source. The focus of this work is to model the electrodynamics within the ion source, including the effects of the more intense positive cesium ion beam and the sputtered sample negative-ion beam. Simulations using Integrated Engineering Software's Lorentz 2E ion optics software will guide the design of a new ion source with the goal of increasing the emitted sample ion current while also improving the emittance of this beam. Following a short overview of the AMS system, details of the ion source, including the mutual space-charge interaction of the two beams, will be presented.

**Authors:** TIESSEN, Collin (Andre E. Lalonde Accelerator Mass Spectrometry Lab); KIESER, William (University of Ottawa); ZHAO, Xiaolei (University of Ottawa)

**Presenter:** TIESSEN, Collin (Andre E. Lalonde Accelerator Mass Spectrometry Lab)

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