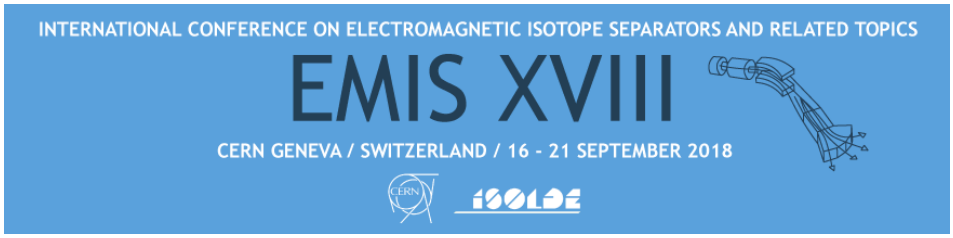


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# Upgrades of the GANDALPH photodetachment detector- towards the determination of the electron affinity of astatine

*Tuesday 18 September 2018 17:25 (1 minute)*

The Gothenburg ANion Detector for Affinity measurements by Laser PHotodetachment (GANDALPH) has been designed to determine electron affinities (EA) of radioisotopes. A first goal is the determination of the EA of astatine, the rarest naturally occurring element on earth [1]. The EA of astatine, together with the previously measured first ionization potential (IP) [2] gives valuable benchmarks for quantum chemical calculations predicting the chemical properties of this element and its compounds. As a milestone, the first ever photodetachment measurement of a radioisotope was successfully conducted with a negative 128-iodine beam produced at CERN-ISOLDE [3].
In order to improve the suitability to study ion beams with low intensity (<1pA), we have upgraded GANDALPH in several aspects. First, a dedicated off-line negative ion source has been constructed and attached to GANDALPH. This will facilitate off-line tests and fine tuning of the neutral atom detector as well as the electrostatic elements in the beam-line. Second, a new particle detector has been installed, which will be used to measure the ion beam currents that are expected to be very small. Finally, we have installed segmented apertures that will allow a more efficient beam tuning through GANDALPH.
In this paper the GANDALPH beam-line and its upgrades will be presented. Further, the off-line ion source will be introduced and off- and on-line results will be discussed.

[1] I. Asimov. J. Chem. Educ. (1953)
[2] S. Rothe et al. Nature Communications (2013)
[3] S. Rothe et al. Journal of Physics G: Nuclear and Particle Physics 44 (2017)

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