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Source of negative ions for matter-antimatter studies

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Forming antiprotonic atoms and their investigation is one of the goals of the AEgIS project at CERN. An intermediate stage of such an experiment is preparing a set of negative, atomic ions, co-trapped with antiprotons in a Penning trap. Such anions must be delivered in a single pulse, which requires an efficient, well-controlled, pulsed source of the ions.

Since attachment of electrons to neutral atoms is forbidden by momentum and energy conservation, the production of anions must be achieved via electron-molecule dissociative attachment process, enhanced by some shape or Feshbach resonance effects.

In the presentation, we will show our newly designed source of negative ions using electron collisions with iodine molecules inside a linear Paul trap. Details of the source construction and operation will be discussed as well as the electron dissociative attachment phenomenon. Additionally, the results of the numerical simulations of the source performance will be presented.

Primary authors: Dr KLOSOWSKI, Lukasz (Nicolaus Copernicus University); Dr PIWINSKI, Mariusz (Nicolaus Copernicus University in Toruń); Mr TESKE, Marek (Nicolaus Copernicus University)

Presenter: Dr KLOSOWSKI, Lukasz (Nicolaus Copernicus University)

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