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**Alternating acceleration of positive and negative ions for space propulsion applications<sup>1</sup>**

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Classical electric propulsion systems accelerate positive ions for thrust and neutralize the ion beam by electrons downstream of the acceleration stage. The distinctive feature of the PEGASES thruster concept is that both positive and negative ions are accelerated to provide thrust, such that an additional neutralization system is redundant. The key to generate fluxes of both types of ions is the formation of an ion-ion plasma where the electron density is negligible compared to the negative ion density. The basic principles of ion-ion plasma formation are relatively well known. On the contrary, the extraction and acceleration of oppositely charged ions in alternating phases is the current challenge in the development of this new thruster. In this presentation we will focus on the physics of gridded ion acceleration, where the grid in contact with the ion-ion plasma is alternately biased with the aim of generating consecutive bursts of positive and negative ions. In the experimental investigation different bias waveforms and frequencies are applied to the grid, and the extracted ion beam velocities and ion beam fluxes are monitored by time resolved retarding field ion energy analyzers and planar probes.

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