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## Mach probe diagnostic for determining positive ion fluxes in H<sup>-</sup> ion sources

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In NNBI ion sources neutral hydrogen atoms and positive ions impact on low work function grid surfaces, where they are converted to negative ions and subsequently extracted. Knowledge and control of the positive ions flux is hence crucial for optimizing the negative ion yield and also for benchmarking numerical models. To this end a Mach probe diagnostic can be used, which determines the direction and magnitude of the positive ion flux. The plasma in ion sources is typically weakly magnetized, rendering the interpretation of Mach probe data difficult. For this reason a two step approach was chosen, where at first a previously used Mach probe was re-commissioned and applied in a well diagnosed and versatile laboratory scale experiment. From these experiments important insights regarding the design of a new combined Langmuir- and Mach probe, its calibration procedure and data interpretation were obtained. As a second step the newly designed probe is applied in the ITER prototype RF negative ion source, where the fluxes of positive ions are obtained in the vicinity of the extraction system. This contribution covers the results from the small laboratory scale experiment as well as first measurements of the positive ion flux in the ITER prototype ion source.

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