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Research and Development of RF Based Negative Ion Source Prototype for CRAFT NNBI

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A radio frequency (RF) based negative ion source was designed for the The Comprehensive Research Facility for Fusion Technology (CRAFT) NNBI system. In order to understand the physics and pre-study the engineering problems, a prototype source with single driver and a three electrons accelerator was designed and developed. Furthermore, a negative ion source test facility were developed in the same time. On the test facility, the negative ion source prototype was tested with RF plasma generation, negative ion production, extraction and acceleration. The long pulse plasma generation with 1000 s was tested and achieved firstly. Then the negative ion production was tested without and with Cs injection. Finally, the long pulse of negative ion beam extracted and acceleration with 100s was tested successfully. It lays good foundation for the R&D of negative ion source for CRAFT NNBI system.

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