

Abstract Submitted
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A Pre-ionization System to Limit Neutral Gas in a Compact Toroid Injector IAN ALLFREY, THOMAS ROCHE, Tri Alpha Energy, Inc., TADAFUMI MATSUMOTO, Nihon University, EUSEBIO GARATE, HIROSHI GOTA, Tri Alpha Energy, Inc., TOMOHIKO ASAI, Nihon University, AND THE TAE TEAM — Fusion plasmas require long lifetimes and high temperatures, both of which are limited by particle loss, among other factors. Therefore, refueling a long-lived advanced beam-driven field-reversed configuration (FRC) plasma in C-2U [1] is necessary, and injecting a supersonic compact toroid (CT) is an effective means of introducing particles into the FRC core [2]. However, neutral gas that trails the CT into the target chamber cools the FRC. Pre-ionization (PI) system assists the breakdown between electrodes of the CT injector (CTI), so the amount of introduced gas can be lowered by up to a factor of two, effectively increasing the ionization fraction; thus, reducing the amount of neutral gas in the system. Additionally, the PI decreases the delay in CTI breakdown so a highly reproducible operation is achievable. The PI system consists of a fast, high voltage, pulse discharge circuit coupled to a Teflon insulated semi-rigid coaxial cable inserted into the CTI. System details and experimental data will be presented, in addition to issues such as the introduction of impurities and pre-ionizer lifetime. [1] M. Binderbauer *et al.*, Phys. Plasmas 22, 056110 (2015). [2] T. Matsumoto *et al.*, Rev. Sci. Instrum. 87, 053512 (2016).

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