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ICC/P3-02: A New High Performance Field Reversed Configuration Regime Through Edge Biasing and Neutral Beam Injection

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Field Reversed Configurations (FRCs) with high confinement are obtained in the C-2 device by combining plasma gun edge biasing and neutral beam injection. The plasma gun inward radial electric field counters the usual FRC spin-up and mitigates the n = 2 rotational instability without applying quadrupole magnetic fields. The FRCs are nearly axisymmetric, which enables fast ion confinement. The plasma gun also produces ExB shear in the FRC edge layer, which may explain the observed improved particle transport. The combined effects of the plasma gun and of neutral beam injection yield a new High Performance FRC regime with confinement times improved by factors 2 to 4 and FRC lifetimes extended from 1 to 3 ms.

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