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Experimental investigation of plasma relaxation using a compact coaxial magnetized plasma gun in a background plasma YUE ZHANG, ALAN LYNN, MARK GILMORE, University of New Mexico, SCOTT HSU, Los Alamos National Laboratory, UNIVERSITY OF NEW MEXICO COLLABORATION, LOS ALAMOS NATIONAL LABORATORY COLLABORATION — A compact coaxial plasma gun is employed for experimental studies of plasma relaxation in a low density background plasma. Experiments are being conducted in the linear HelCat device at UNM. These studies will advance the knowledge of basic plasma physics in the areas of magnetic relaxation and space and astrophysical plasmas, including the evolution of active galactic jets/radio lobes within the intergalactic medium. The gun is powered by a 120pF ignitron-switched capacitor bank which is operated in a range of 5 - 10kV and ∼100 kA. Multiple diagnostics are employed to investigate plasma relaxation process. Magnetized Argon plasma bubbles with velocities ∼1.2Cs and densities ∼1020 m^{-3} have been achieved. Different distinct regimes of operation with qualitatively different dynamics are identified by fast CCD camera images, with the parameter determining the operation regime. Additionally, a B-dot probe array is employed to measure the spatial toroidal and poloidal magnetic flux evolution to identify detached plasma bubble configurations. Experimental data and analysis will be presented.

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