Abstract Submitted
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Design of a New Acceleration System for High-Current Pulsed Proton Beams from an ECR Source[1] ANDREW L. COOPER, IVAN POGREBNYAK, JASON T. SURBROOK, KEEGAN J. KELLY, University of North Carolina at Chapel Hill and TUNL, BRET P. CARLIN, Duke University and Triangle Universities Nuclear Laboratory (TUNL), ARTHUR E. CHAMPAGNE, THOMAS B. CLEGG, University of North Carolina at Chapel Hill and TUNL — A primary objective for accelerators at TUNL's Laboratory for Experimental Nuclear Astrophysics (LENA) is to maximize target beam intensity to ensure a high rate of nuclear events during each experiment. Average proton target currents of several mA are needed from LENA's electron cyclotron resonance (ECR) ion source because nuclear cross sections decrease substantially at energies of interest <200 keV. We seek to suppress undesired continuous environmental background by pulsing the beam and detecting events only during beam pulses. To improve beam intensity and transport, we installed a more powerful, stable microwave system for the ECR plasma, and will install a new acceleration system. This system will: reduce defocusing effects of the beam's internal space charge; provide better vacuum with a high gas conductance accelerating column; suppress bremsstrahlung X-rays produced when backstreaming electrons strike internal acceleration tube structures; and provide better heat dissipation by using deionized water to provide the current drain needed to establish the accelerating tube's voltage gradient. Details of beam optical modeling calculations, proposed accelerating tube design, and initial beam pulsing tests will be described.

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