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Instrumental Implementation of an Experiment to Demonstrate $\alpha\omega$-dynamos in Accretion Disks JIAHE SI, RICHARD SONNENFELD, ART COLGATE, New Mexico Institute of Mining and Technology, HUI LI, Los Alamos National Lab, MARK NORNBERG, University of Wisconsin-Madison — The New Mexico Liquid Metal $\alpha\omega$-dynamo experiment is aimed to demonstrate a galactic dynamo. Our goal is to generate the ω-effect and α-effect by two semi-coherent flows in laboratory. Two coaxial cylinders are used to generate Taylor-Couette flows to simulate the differential rotation of accretion disks. Plumes induced by jets injected into the Couette flows are expected to produce helicities necessary for the α-effect. We have demonstrated an 8-fold poloidal-to-toroidal flux amplification from differential rotation (the ω-effect) by minimizing turbulence in our apparatus. To demonstrate the α-effect, the experimental apparatus is undergoing significant upgrade. We have constructed a helicity injection facility, and are also designing and testing a new data acquisition system capable of transmitting data in a high speed rotating frame. Additional magnetic field diagnostics will also be included. The upgrade is intended to answer the question of whether a self-sustaining $\alpha\omega$-dynamo can be constructed with a realistic fluid flow field, as well as to obtain more details to understand dynamo action in highly turbulent Couette flow.

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