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## Magnetic-Field Driver for Magnetized Plasma –Laser Experiments on the Z Beamlet Laser Facility

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A modular pulsed-power driver has been developed to create an applied magnetic field for high-intensity laser experiments. The system is presently being using on Sandia's Z Beamlet Laser facility and was previously used at the Texas Petawatt laser facility at the University of Texas at Austin. Its design includes use of low inductance circuit elements, a single-turn coil, up to six  $3.1 \,\mu$ F 100 kV high energy density capacitors (15.5 kJ each), and one high voltage spark gap switch per capacitor. Each capacitor discharges via six high voltage cables into a newly-designed vacuum interface and vacuum transmission line. Current rise time is  $1.7 \,\mu$ s with peak current that can exceed 1.2 MA at full charge voltage with six capacitors. System inductance is about 48 nH, including the single-turn coil. A major challenge has been to deliver current to the coil in vacuum without a significant inductance penalty or damage to the vacuum system. The system is presently configured with a single-turn cm-scale coil to create a magnetic field up to 20 T, which is achieved at much less than full charge voltage using 4 capacitor/switch modules. At these levels the coil is not destroyed with each shot. We will describe implementation of this system on the Z Beamlet Laser system and initial results from magnetized plasma experiments. We will also describe potential design upgrades that enable even more energetic, compact, and portable drivers.

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