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4P68 - Faraday-Rotation fiber-based gauge for current measurement in pulse-power systems

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Diagnostics of pulse-power systems is a challenging experimental task. The high electric and magnetic fields that are usually involved in their operation can interfere the measurement, and moreover, can damage sensitive electronic data acquisition systems. Optical fibers, being almost immune to electric noise pick-up, are thus favorable as gauges or transmission lines in noisy systems.

In the following contribution we introduce a novel technique to measure absolute current, based on the Faraday-rotation of light in a magnetic field. Using this method, we measure Mega-Amps current in a pulsed power machine in the final stage of a vacuum transmission line and in close proximity to a z-pinch plasma. The gauging system design is based on off-the-shelf 1550nm fiber components, it does not require alignment and can be used easily anywhere current measurement is required and a thin optical fiber can be inserted. We will show here the design of the measuring system, calibration, and experimental results from our gas-puff z-pinch experiments.

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