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## LWFA: Electron Cyclotron Resonance Imaging

*Wednesday, September 27, 2017 7:30 PM (1 hour)*

The multitude of imaging techniques for ultrafast laser-plasma interactions points to the wealth of knowledge that can be gained by having quantitative information about the interaction. Analysis and results on tracking the evolution of magnetic fields in the LWFA structure will be presented. To this end, few-cycle shadowgraphy has been combined with polarization and spectral filtering to understand the interplay of the Faraday, Cotton-Mouton and birefringence effects as they imprint information about the LWFA structure onto the probe beam. Experiments were performed at the JETI 40 laser system in Jena, Germany using a few-cycle VIS-NIR probe beam temporally synchronized to the driver laser. 3D PIC and plasma fluid simulations have also been implemented to help understand the complex interactions taking place during electron injection and acceleration. The goal of this work is to further develop diagnostics for investigating the various magnetic fields found within the LWFA process, be they from the driving laser, the accelerated electron bunch, the streaming walls of the electron cavity, or otherwise. With this knowledge, a better understanding of the highly dynamic and nonlinear process of plasma-based particle acceleration can be gained and improvements to simulation codes can be tested.

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