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Using Photon Accleration to Visualize Bubble Evolution in a LWFA ERIC D'AVIGNON, AUSTIN YI, GENNADY SHVETS, University of Texas at Austin — Diagnosing relativistic plasma structures, such as the bubble of an LWFA, presents a considerable challenge to numerical simulations. We present an approximative technique, photon acceleration [1], which has received little attention despite its versatility. Photon acceleration can effectively simulate techniques such as Fourier Domain Holography [2], techniques necessary to achieve a more complete understanding of a bubble's structure. Furthermore, photon acceleration provides intuitive visualization of local frequency shift, as well as light trapping and deflection by a bubble. We will discuss the extensions to photon acceleration required to handle FDH, the most important being the inclusion of field phase. Finally, we will use the photon acceleration framework to uncover information about bubble evolution, which has recently been shown to be critical to electron self-injection [3].

[1] Mendonca, J.T., "Theory of Photon Acceleration"
[2] Dong, Reed et al., "Formation of Optical Bullets in Laser-Driven Plasma Bubble Accelerators"
[3] Kalmykov, Yi et al., "Electron Self-Injection and Trapping into an Evolving Plasma Bubble"

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