Abstract Submitted for the DAMOP07 Meeting of The American Physical Society

High-harmonic generation with relativistic laser intensities¹ CARL SCHROEDER, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory — A method for producing hard x-rays via high-harmonic generation using ultra-intense lasers is proposed. The method relies on cavitation and ion channel formation by the ponderomotive force of a short, ultra-intense laser pulse or the space charge force of a dense, energetic electron beam. A second laser produces high harmonics in the electron-free cavity. A counter-propagating laser is used to eliminate the longitudinal motion owing to the magnetic component of the Lorentz force in the relativistic regime. A counter-propagating laser pulse train is proposed for quasi-phase matching. This method enables the reach of high-harmonic generation to be extended to the sub-Å regime.

¹Supported by the U.S. DOE under Contract No. DE-AC02-05CH11231.

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Date submitted: 01 Feb 2007

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