

Abstract Submitted  
for the DPP05 Meeting of  
The American Physical Society

**Laser Wakefield Acceleration of Photons** C. MURPHY<sup>1</sup>, R. TRINES, R. BINGHAM<sup>2</sup>, J.T. MENDONCA<sup>3</sup>, P. NORREYS, CCLRC - Rutherford Appleton Laboratory, Didcot, UK, A. REITSMA, J. GALLACHER, D. JAROSZYNSKI, Department of Physics, University of Strathclyde, Glasgow, UK, K. KRUSHELNICK, S. MANGLES, A. THOMAS, Z. NAJMUDIN, Blackett Laboratory, Imperial College, London, UK — Theory and simulation have for some time been able to predict that light can be shifted in frequency by a moving refractive index gradient. This has been observed experimentally in the case of a relativistic ionisation front. The effect has been considered for diagnosis of wakefields such as the one postulated for an electron accelerator. Here we present the first observation of photon acceleration from a laser-produced wakefield. In our experiments, the Astra laser at the Rutherford Appleton Laboratory was focused into jet of helium. The spectrum of the transmitted light was measured. We observe a blue shifted portion of the light which cannot be explained by acceleration from the ionisation front but can be explained by photon acceleration in a wakefield. A photon kinetic code has been implemented and can qualitatively reproduce the measured spectrum. The feasibility of using this effect as a wakefield diagnostic is discussed.

<sup>1</sup>Also at Blackett Laboratory, Imperial College

<sup>2</sup>Also at Department of Physics, University of Strathclyde

<sup>3</sup>Also at Instituto Superior Technico, Lisbon, Portugal

Christopher Murphy  
CCLRC - Rutherford Appleton Laboratory, Didcot, UK

Date submitted: 25 Jul 2005

Electronic form version 1.4