

Abstract Submitted  
for the APR12 Meeting of  
The American Physical Society

**Temperature of the Vacuum Accelerated by External Fields<sup>1</sup>**

LANCE LABUN, JOHANN RAFELSKI, The University of Arizona — Using the result of Müller et al. [1], we show that in a constant electric field  $E$ , the electron fluctuations  $\langle \bar{\psi}\psi \rangle$  display a thermal Bose spectrum with temperature  $T = eE/m\pi = a/\pi$ . This result contrasts with the Fermi spectrum and Hawking-Unruh temperature  $T_{HU} = a/2\pi$  expected from viewing the vacuum fluctuations of the electrons as accelerated [2,3]. We consider the temperature in the electric field as a function of magnetic moment  $g$ . We find that the temperature in the electric field arises from the Dirac spinor nature of the electron with  $g = 2$  and, setting arbitrarily  $g = 1$ , we recover the Hawking-Unruh  $T_{HU} = a/2\pi$  with a Fermi spectrum.

[1] B. Muller, W. Greiner, and J. Rafelski, Phys. Lett. A63, 181 (1977).

[2] L.C.B. Crispino, A. Higuchi, George E.A. Matsas, Rev. Mod. Phys. 80, 787 (2008).

[3] W.-Y. Pauchy Hwang and S. P. Kim, Phys.Rev. D80, 065004 (2009).

<sup>1</sup>Supported by a grant from the U.S. Department of Energy, DE-FG02-04ER41318.

Lance Labun  
The University of Arizona

Date submitted: 10 Jan 2012

Electronic form version 1.4