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Photoluminescence from a gold nanotip as an example of tabletop Unruh-Hawking radiation. IGOR SMOLYANINOV, University of Maryland — Conversion of zero-point quantum fluctuations into real thermal photons which may occur in a curved space-time is the main mechanism behind the Hawking radiation and the Unruh effect [1]. Up to date no experimental verification of these effects and the related dynamical Casimir effect has been reported. Here we argue that the recently observed infrared photoluminescence from a gold nanotip, which is mediated by surface plasmons (SP) propagating over a curved metal tip surface [2], constitutes an example of such zero-point to real photon conversion. Since SP wavelength may be very short, a surface plasmon wave packet propagating along a curved metal surface with radius of curvature $R \sim 1$ micrometer may be considered as a classical particle (this would correspond to the ray optics approximation). The centripetal acceleration of such particle may be as large as $a \sim c^2/R \sim 10^{22} g$. According to ref. [1], such particle perceives vacuum as a bath of thermal radiation with temperature $T = \hbar a/2\pi kc \sim 1000K$. Nonlinear optical mixing of SPs with the thermal quanta from this bath looks like infrared photoluminescence in the laboratory reference frame. This work was supported in part by NSF grants ECS-0304046, CCF- 0508213 and ECS-0508275. References [1] W.G. Unruh, Phys.Rev.D 14, 870 (1976). [2] M.R. Beversluis, A. Bouhelier, and L. Novotny, Phys.Rev.B 68, 115433 (2003).

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