

Abstract Submitted  
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**Modeling a Carbon Nanotube Field Emitter Vacuum Triode<sup>1</sup>**

DOUGLAS CLAUSS, BEN YU-KUANG HU, ALPER BULDUM, University of Akron — Carbon nanotubes hold the promise of diverse applications in many emerging fields. In particular, the low-voltage field emission capabilities of nanotubes make them prime candidates for nanoscale amplifiers. Towards this goal, we model a carbon nanotube as the cathode of a field emission vacuum triode, in which the gate of the triode is a nanoscale metallic aperture. We use a relaxation algorithm to numerically solve Laplace's equation for the electrostatic fields within the device. We utilize these fields, together with the electronic structure of the nanotube, to calculate the  $I$ - $V$  characteristics of the triode as a function of gate voltage and emitter-aperture distance. We also discuss the feasibility of the fabrication of this device.

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