Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Electron Impact Excitation Collisions and Atomic Models for RF Breakdown Simulations[1] SUDHAKAR MAHALINGAM, SETH VEITZER, PETER STOLTZ, Tech-X Corporation — Neutrino factory experiments will produce high-intensity beams through the in-flight decay of muons. Such high-intensity muon beams can be produced effectively using cavities that employ high field gradients for acceleration. However, such cavities are limited by breakdown phenomena. Recent muon cooling experiments and numerical simulations of RF breakdown models provide insights into the possible triggering mechanisms responsible for breakdown. We are currently improving our numerical RF breakdown models by including detailed atomic and plasma processes such as electron impact excitation, plasma radiation, and electron impact X-ray emission from cavity surfaces. We describe here the new physics algorithms that are being implemented as a numerical library and are being interfaced to a number of particle-in-cell plasma simulation codes. The required atomic and surface interactions data are obtained from Evaluated Electron Data Library (EEDL) available from IAEA Nuclear Data Services. Also we describe the tracking of different excited levels of copper atoms in the 3-D PIC plasma simulation code VORPAL.

[1]This work was funded under the auspices of DOE through the SBIR program contract #DE-FG02-07ER84833.

Sudhakar Mahalingam
Tech-X Corporation

Date submitted: 12 Jan 2009 Electronic form version 1.4