

Abstract Submitted
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Role of Nottingham and Thomson effects in heating of micro-protrusion in high-gradient accelerating structures¹ AYDIN KESER, IREAP, University of Maryland, GREGORY NUSINOVICH, DMYTRO KASHYN, THOMAS ANTONSEN, IREAP, University of Maryland, College Park — It is widely accepted that one of the reasons for appearance of the RF breakdown which limits operation of high-gradient accelerating structures is the electron dark current [1]. This field emitted current, usually considered as a precursor of the breakdown, can be emitted from apexes of micro-protrusions on a structure surface. Therefore field and thermal processes in such protrusions deserve careful studies [2, 3]. The goal of our first study [3] was to analyze 2D process of RF field penetration inside protrusion of a metal with finite conductivity and to study corresponding Joule heating. In the current study, it is found that space charges can have a stabilizing effect on the electric field. We include a modification of the 1D model described in [4]. Moreover, we include into consideration, first, the Nottingham effect which may significantly change the protrusion heating. We also investigate the interplay between high temperature gradients and electric fields (Thomson heating).

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