

CASIMIR FORCE INDUCED
ON A PLANE BY AN IMPENETRABLE
FLUX TUBE OF FINITE RADIUS

V.M. Gorkavenko¹, Yu.A. Sitenko², O.B. Stepanov²

¹Faculty of Physics,
Taras Shevchenko National University of Kyiv
(64, Volodymyrs'ka Str., Kyiv 01601, Ukraine;
e-mail: gorka@univ.kiev.ua),

²Bogolyubov Institute for Theoretical Physics,
Nat. Acad. of Sci. of Ukraine
(14-b, Metrologichna Str., Kyiv 03680, Ukraine;
e-mail: yusitenko@bitp.kiev.ua, pnd_@ukr.net)

S u m m a r y

A perfectly reflecting (Dirichlet) boundary condition at the edge of an impenetrable magnetic-flux-carrying tube of nonzero transverse size is imposed on the charged massive scalar matter field which is quantized outside the tube on a plane, which is transverse to the tube. We show that the vacuum polarization effects outside the tube give rise to a macroscopic force acting at the increase of the tube radius (if the magnetic flux is held steady).