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# Čerenkov radiation in discontinuous media: a quantum view-point

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## Abstract

The photon propagator in the Čerenkov radiation off a charged particle moving in a dielectric slab immersed within another dielectric medium is derived. From the vacuum-to-vacuum transition amplitude, an explicit expression is obtained for the photon number density of given frequency of photons radiated per unit path length of the particle. In particular, it is shown that near threshold, the density behaves like  $\sin \theta_c$  rather than of the well known behavior of  $\sin^2 \theta_c$  for uniformly extended media and may be of interest experimentally, where  $\theta_c$  is the Čerenkov-cone half-angle. The derived expression is applied to the visible region. The analysis is given from a field-theory view-point. © 1999 Published by Elsevier Science B.V. All rights reserved.

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