



ON THE EFFECTS OF GEOMETRY ON GUIDED ELECTROMAGNETIC WAVES

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Abstract. The method of moving Cartan frames is used to analyse the influence of geometry on the behavior of electromagnetic fields in confining guides and the effect of such fields on their ultra-relativistic sources. Such issues are of relevance to a number of topical problems in accelerator science where the need to control the motion of high current-density micro-meter size bunches of relativistic radiating charge remains a technical and theoretical challenge. By dimensionally reducing the exterior equations for the sources and fields on spacetime using symmetries exhibited by the confining guides one achieves a unifying view that offers natural perturbative approaches for dealing with smooth non-uniform and curved guides. The issue of the back-reaction of radiation fields on the sources is approached in terms of a simple charged relativistic fluid model.¹

Keywords: Waveguides, Maxwell equations, Relativistic Particles, Accelerator Science, Cartan frames, radiation

¹ Within the minisymposium: GEOMETRY IN PHYSICS the second part of the general lecture under the same title is presented.