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Radiation Processes in Dielectric Cylindrical Waveguides

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Dielectric cylindrical waveguides are widely used for confining and guiding of electromagnetic waves in relatively wide range of frequencies. They have found numerous technological and scientific applications in telecommunications, medicine, material science, photonics and quantum optics. In this presentation, we will discuss the applications of dielectric cylindrical waveguides in the generation of various types of electromagnetic radiation by charged particles interacting with the waveguide. The influence of the dielectric waveguide on the spectral and angular characteristics of the Cherenkov and synchrotron radiations is examined. It will be demonstrated that under specific conditions pertaining to the parameters of the charged particle motion strong narrow peaks emerge in the spectral and angular distributions of the radiations. We also consider the radiation by charged particles on guiding modes of cylindrical waveguide and the generation of surface polaritons. The spectral distributions of the corresponding energy losses are discussed.

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