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Channeling of proton beams through bundles of chiral carbon nanotubes

High brightness beam manipulation is an important topic in several applications of accelerators in medicine and other industrial and scientific areas. The key question is dealing with the emittance control through the whole accelerator system including the tools for focusing and bending. In recent years, particular efforts are paid to improve the quality of the beams by means of nanostructures in order to obtain low emittance in micro and nanobeams. This contribution is dedicated to the simulation of the channeling of charged particles in nanotubes and to the presentation of them as a possible technique to be used in determining the emitance of nanobeams in the accelerator systems. The simulation is based on a dynamical continuum approach for the interaction potential along the nanotube axis taking into account the nanotube symmetry and the particle energy. Monte Carlo methods are used for the beam generation, the particle multi-scattering (on the electron cloud) contribution, and for the stopping power during the channeling process. Finally, it is discussed the effects on emittance in channeling by chiral carbon nanotubes.

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