

Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Studies of Six-Dimensional Cooling of a Muon Beam AMIT KLIER,
GAIL HANSON, University of California Riverside — The reduction of the phase-space volume (emittance), also known as “beam cooling,” is an essential ingredient in muon colliders and is also very useful in neutrino factories. In a muon collider, in particular, the six-dimensional emittance must be reduced by about six orders of magnitude. Ionization cooling is used for transverse emittance reduction. In this process, the beam loses energy through ionizations in an absorber and then regains only longitudinal momentum in RF cavities. Cooling the beam longitudinally is achieved through the process of emittance exchange, in which the beam loses energy by passing through wedge-shaped absorbers in a dispersive magnetic field, designed in such a way that fast muons travel through more absorber material than slow ones and thus lose more energy. Six-dimensional cooling is done by combining the two processes. We simulate cooling channels, in which a muon beam is cooled in all six phase space dimensions while rotating several times in a ring or ring-like cooling channel. Some ring designs and cooling simulation results are presented and discussed.

Amit Klier
University of California Riverside

Date submitted: 13 Jan 2006

Electronic form version 1.4