Analytic Studies of Muon Cooling Channels*,
C. CELATA, <u>A. SESSLER</u> and J. WURTELE,
Lawrence Berkeley National Laboratory - In order to
understand, design and study cooling channels for a Muon
Collider we have developed a semi-analytic formalism. Our
analysis is valid for single particles; i.e., it ignores space
charge effects, which is a valid assumption in practice.
Starting with the elements considered for cooling--long
solenoids, short solenoids, drift spaces, lithium lenses, rf
cavities, lithium energy loss foils and liquid hydrogen
energy loss regions--we form the transformations
describing each of these elements. Concatenation of these
elements is then done rather easily, and quickly, by a
computer. We also linearize these transformations, and
thus can reduce the subject to the multiplication of matrices.
We also combine the matrix approach with certain
constraints (such as dynamic aperture); arguing that within
the allowed regions the linear approximation is reasonably
valid. Formulas are given for the constraints and
comparisons are made amongst the three semi-analytic
approaches and the exact particle tracking procedure.