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Beam optics and magnet studies for neutralizer storage rings

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The design of efficient storage rings with large acceptance so that a neutralizer gas cell can be inserted requires both linear matrix formalism and full field tracking calculation. Moreover large magnet aperture must be considered.
First an unbiased search of suitable lattices is needed. Matrix formalism is simple enough to allow use of symbolic manipulation programs, with s the beam direction, x,y the transverse coordinates, and Mx, My the corresponding transport matrices: the conditions that
|trace(Mx)| < 2 and |trace(My)| < 2
can be reduced (automatically) to simple inequalities for lattice side lengths. Numerical optimizations are also discussed.
Differently from usual storage rings, primary beam consumes in few passage through neutralizer cell, so angle injection seems possible.
Field tracking simulation needs a rapid method to calculate field from pole footprints and shape, which preferably avoids the use of differential formulas. The method proposed is compared with analytic result for flat poles. After determining suitable magnet poles, full 3D magnets are designed, for verification.
Analogies with Fixed-Field Alternating Gradient (FFAG) accelerators are noted.

If a proceedings is prepared,
</br> will you submit a contribution?

maybe

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