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High current storage rings for neutral beam injectors

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The gas neutralizer converter used to produce a neutral hydrogen (or deuterium) beam from a H- (or D-) beam has intrinsic limitation on conversion efficiency and requires a residual ion dump for H-, and produced H+. By recirculating H- into gas neutralizer N times (with N up to 4) conversion efficiency can be increased and the ion dump size is greatly reduced. In other words, the gas neutralizer becomes one element of a large acceptance H- storage ring, which is here studied both with linear theory and with numerical simulation.
Among several practical solutions, the rectangular lattice with M=2 and M=4 bending dipole seems the more convenient for an initial studies; symmetry number (number of equal section per turn) is S=2 for both lattices.
It is important to control secondary ion accumulation inside storage rings, which has beneficial effect (reduction of space charge) and unwanted effects (beam stripping in dipoles); clearing electrodes may be useful.
Among advanced concepts, note first that controlling secondary plasma may also produce a plasma neutralizer, with higher efficiency. Second, adding a H+ storage ring, with a long straight section in common, is a convenient method to exploit the H+ and H- mutual neutralization, so that in principle conversion effiency may approach unity.
Application to fusion and other use of dual beam technology are also reviewed.

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

no

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