Determining the Recycler Radius and Energy

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1. **Synchronize MI and Recycler by Changing the MI Bend Field**

The synchronization was checked by turning the Recycler RF off and looking at the Beam with a Recycler Mountain Range.

In order to synchronize the two machines we had to change MBOFF in MI by –48 MeV. In this case:



The energy of the beam in MI will change by:



The MI Radius will also change with the higher momentum beam by:





1. **Change the RF frequency to center the beam in the Recycler**

In order to center the beam in the RR (BPMs) we had to change the RF lock frequency from 52,811,400Hz to 52,809,000Hz. By changing the RF lock frequency both the Energy and Radius coming out the MI will change:



Total MI Radius change: (7.5660-5.7939)mm=1.7721 mm! With this change the MI radius is equal to Recycler Center Radius.

So:



The BPMs in MI will show a dp/p



Total MI momentum change: (-45.457+11.540)MeV=-33.917 MeV!

Based on the above the Recycler center Radius and Energy are determined.

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| **Recycler Radius (m)** | **528.303** |
| **Recycler Momentum (MeV)** | **8850.0** |