

# **MI/RR R&D**

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- Develop a new MI RF system including a second harmonic cavity with enough power to accelerate the Project X intensities.
    - We plan to use the same RF cavities in Recycler
  - Investigate and simulate e-cloud effects in MI with current intensities. Simulate e-cloud beam effects with Project X intensities. Investigate ways to mitigate the e-cloud effects (coatings).
  - Simulate space charge effects in MI. Determine how much of space charge tune shift we can tolerate with Project X intensities.
  - Design a gamma-t jump for MI.
    - Design already developed.



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- Have fixed the rf frequency and developed the rf requirements.
    - Have expanded the tuning range from 6GeV-120GeV.
  - Have developed an RF cavity design with perpendicular biased tuners and R/Q~60 Ohms. We are collaborating with SLAC in optimizing the cavity shape.
    - Working on the HOM dampers.
  - We have bought a high power tube (Eimac 8973) that can drive the new cavity and plan to build a PA for testing.
  - The goal is to have a cavity design review in FY11.
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- Continuing the e-cloud simulations and comparisons with measurements. Started new simulations using VORPAL (Tech-X).
  - Have established dedicated measurement set-up in MI-52 and have developed new RFA detectors. Have mw measurements set-ups at MI-40 and MI-52.
    - Have already installed a TiN coated beam piece and compared it with SS.
  - We are getting ready to establish our own beam-pipe coating set-up in E4R. Our goal is to coat a beam-pipe inside an MI dipole with TiN in collaboration with SLAC.
  - We are collaborating with CERN and we are learning from their experience with amorphous carbon coatings.
    - Have received a carbon coated beam pipe piece that was installed in MI-52



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- Start MI space charge simulations using two different codes Synergia (FNAL) and IMPACT(LBNL).
    - Bench mark each code against each other w/w.o SC using the MI lattice.
    - Include the MI aperture and compare simulations predictions of losses with current operations.
    - Predict the sc tune shifts (spreads) and losses with and without second harmonic and bunch intensities of  $3E11$ .
  - Produce intense bunches at 8 GeV in MI for space charge measurements.
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