MTA Installation & Commissioning Issues

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MAP Modular Cavity Review
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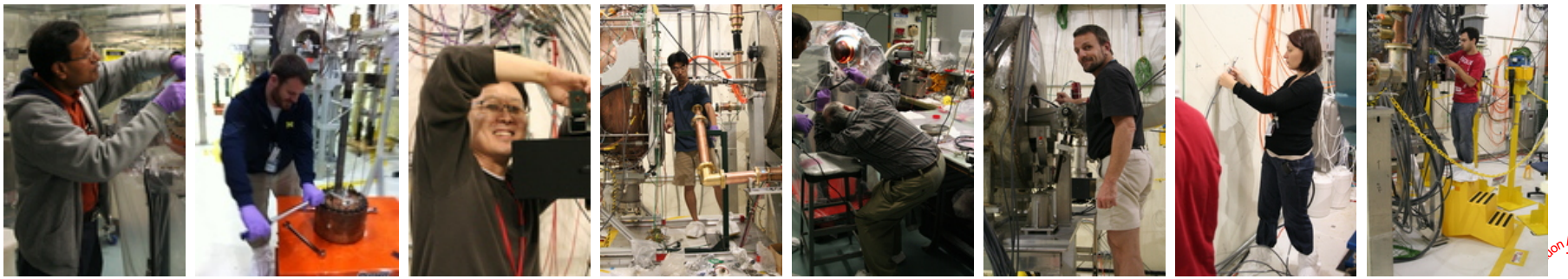


Installation

There are 2 805-MHz RF stations in the MTA

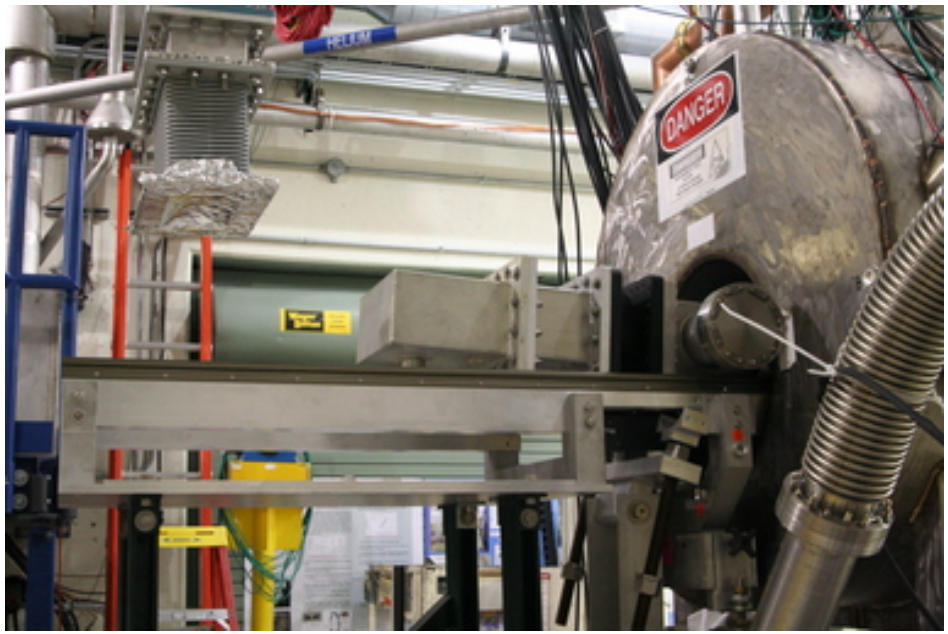
1. solenoid bore
   - main location
   - constrained interface
   - 2m-high centerline
2. upstream
   - used for staging, parallel tests
   - no magnetic field
   - new vacuum system being built
   - flexible interface

Installation

- We don't want to rebuild the MTA around this cavity ..
- Limited space in the hall (will only get worse)
- Should respect various mechanical interfaces
  - Mounting in solenoid bore (support rails)
  - Vacuum system (pump-down port position)
  - RF power feed (RF window position)
  - Water cooling
  - Diagnostics

Mechanical support

- rail system in bore
- cavity mounted on transfer rails and rolled into position
- waveguide, vacuum, water, cable connections done in place



RF Power

- 12MW klystron (Linac test station)
- About 10-120μs at up to 15 Hz
- Power band 800-810 MHz
- Low-power circulator and high-power hybrid available
- New high-power circulator to be recommissioned
- Long WR975 waveguide run
- Minor adjustments near cavity as needed
- Modular cavity plumbing must match existing window location

Vacuum system

- Existing system (scroll, turbo, ion) worked well for other cavities
- Complications due to height and magnetic field
- Modular cavity plumbing must match existing port locations
- We are preparing a similar system for station 2
- Cavity should be shipped under vacuum or purge
- May need to work on diagnostics under purge

Diagnostics

- RF forward, reflected, pickup signals
- Vacuum pressure
- Scintillator+PMT counters for X-ray rates, spectra
- Ionization chambers for radiation dose rates
- Spectrometer for cavity light analysis
- Thermocouples for cavity temperature
- Acoustic sensors for spark detection (under development)
- Toroids for beam intensity
- BPM, MW and scintillator for beam profile
- Environmental monitoring (temp/humidity, clean rm status, etc.)
- Desirable to add direct dark-current measurement/imaging

Controls

- We must stick to a published plan
  defined as an algorithm/parameter set for control system
- LabView-based system used to automate run
  following detailed run plan
- further developed/customized as needed for each device under test
- triggers/interlocks (may be) available for vacuum, light, reflected power

Inspection

- Visual inspection needed to monitor interior surface after run milestones
- Cavity to be moved under purge to/from clean room in hall
- Used Fermilab photography services in the past for documenting easily accessible/visible parts
- Borescope-based inspection through ports hasn't worked well
- Prepare standard setup customized for this cavity geometry
- Off-site inspection (eg. TD microscopy lab) for more detailed analysis

Safety

- Mostly similar to other tests we have done
- Be is a major issue
- Fermilab safety would like to see outer Be surfaces covered (not just coated)
- Preferable to run with Cu first
- Wipes to be taken/tested as needed