Targetry R&D in the 5-Year Plan

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Targetry Tasks

- Simulation (coordinator: Rick Fernow)
  - Benchmark MERIT results
  - Refine MHD modeling of beam/jet/field interactions
  - Refine nozzle simulations
  - Study Hg jet splash issues for Hg collection pool
- Facility Design (in conjunction with the MC RDR)
  - Upstream & downstream beam windows
  - Robotics for target replacement/repairs
  - Design of tungsten/water inner shielding
  - Study use of HTS conductor in target solenoid
- Hardware R&D (see pp. 4-9)

RDR Specifics

Issues in common with MC ZDR (Alan Bross):

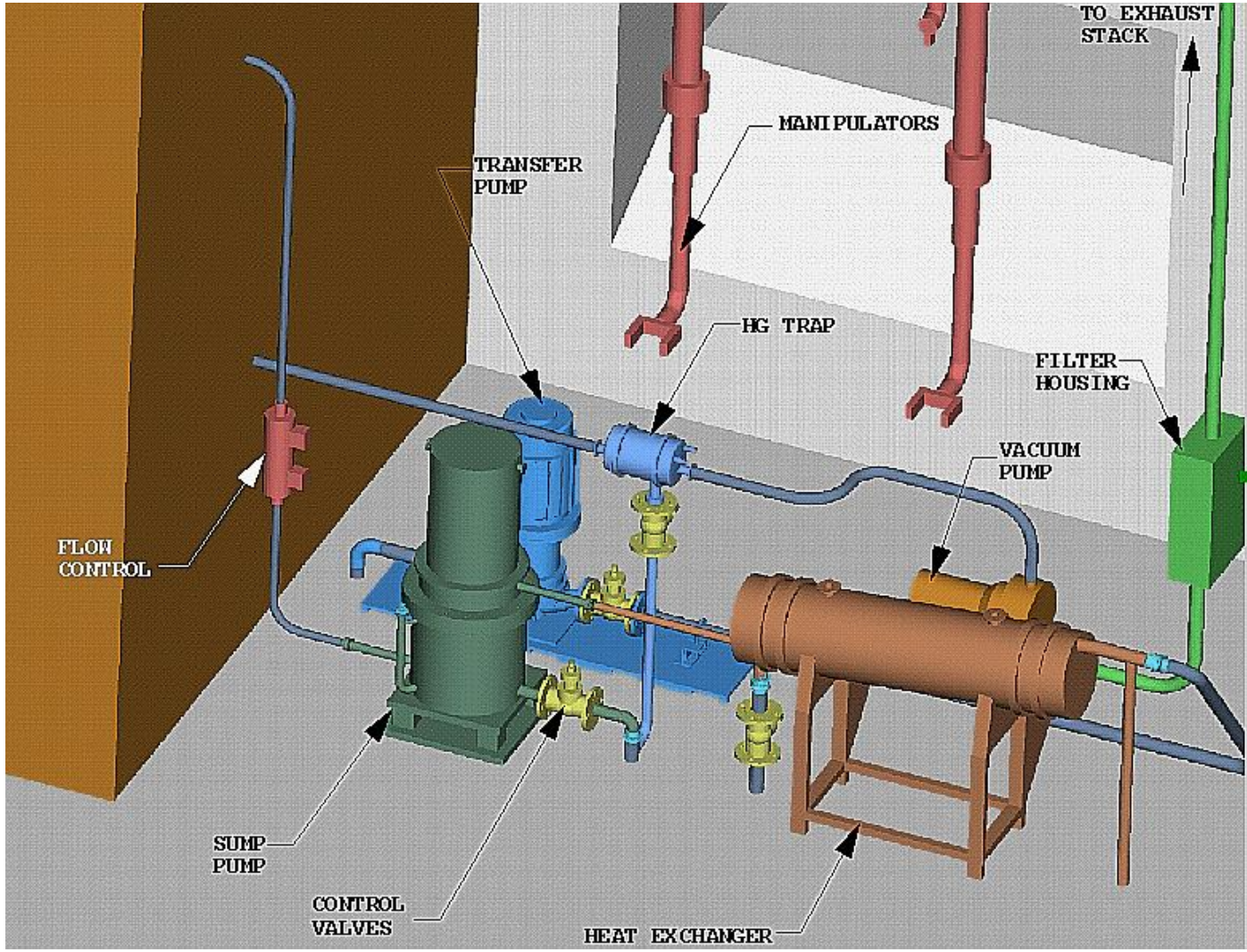
- Proton Driver
  - Interface with Project X team to determine required modifications needed for NF
- Target Station
  - Simulation, next iteration on target facility, detailed engineering of component parts
- Pion Capture and Phase Rotation
  - Complete engineering design for front-end
- Cooling Channel
  - Finalize engineering design of Study 2a channel (MICE +)
    - Possible modifications
      - H_2 gas absorbers
      - Helical cooler

Post-MERIT Targetry Hardware Effort

- Hg Handling Issues
  - Continuous Hg Loop
  - Eurosol/ESS Collaboration
- Hg Jet optimization
  - Nozzle optimization
  - Reconfigured Optical Diagnostics
  - Improved Jet delivery
- Jet/Beam Dump Interaction
  - Jet/Dump Splash Studies
- Iron Plug Studies
- Tungsten-Carbide Shielding

Hg Handling Issues

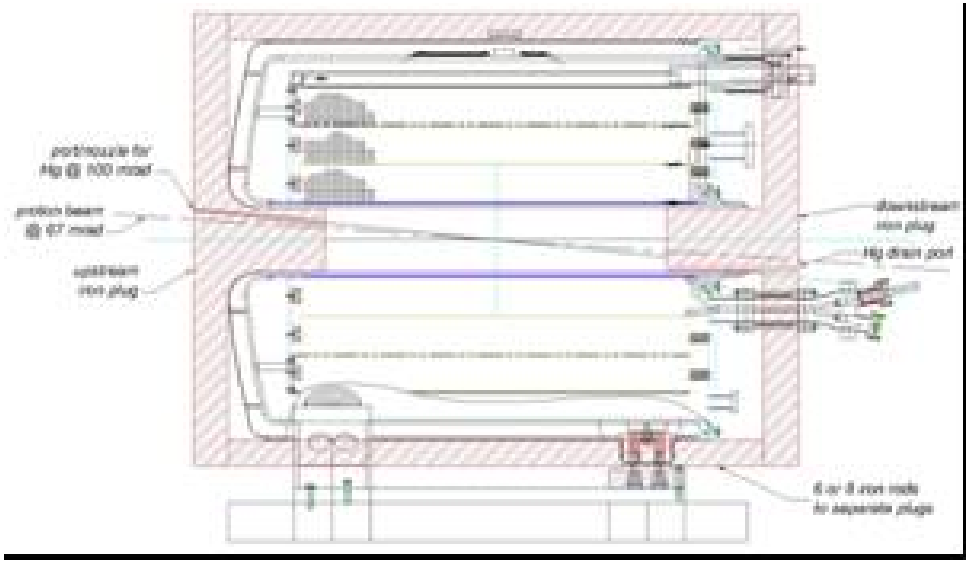
- Engineer Hg loop
- Study CW Hg flow issues
- Acquire Hg safety experience
- Explore collaboration with Eurosol/ESS

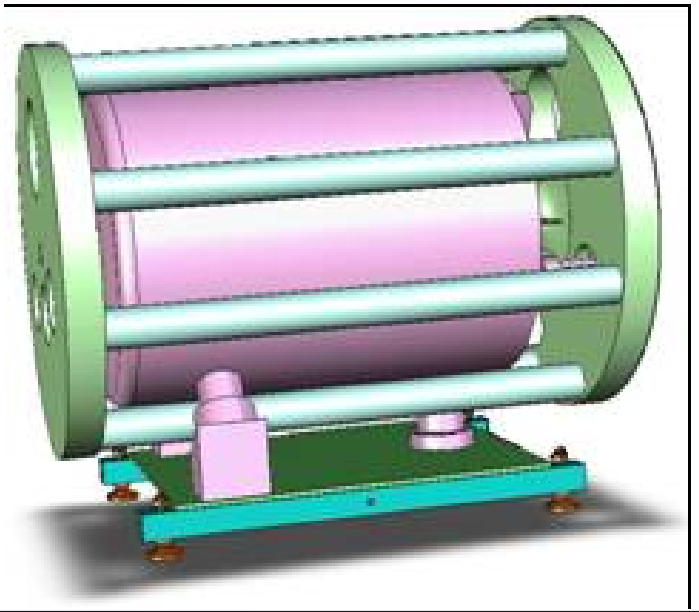


Iron Plug

Purpose: Generate a more uniform magnetic field in jet delivery region

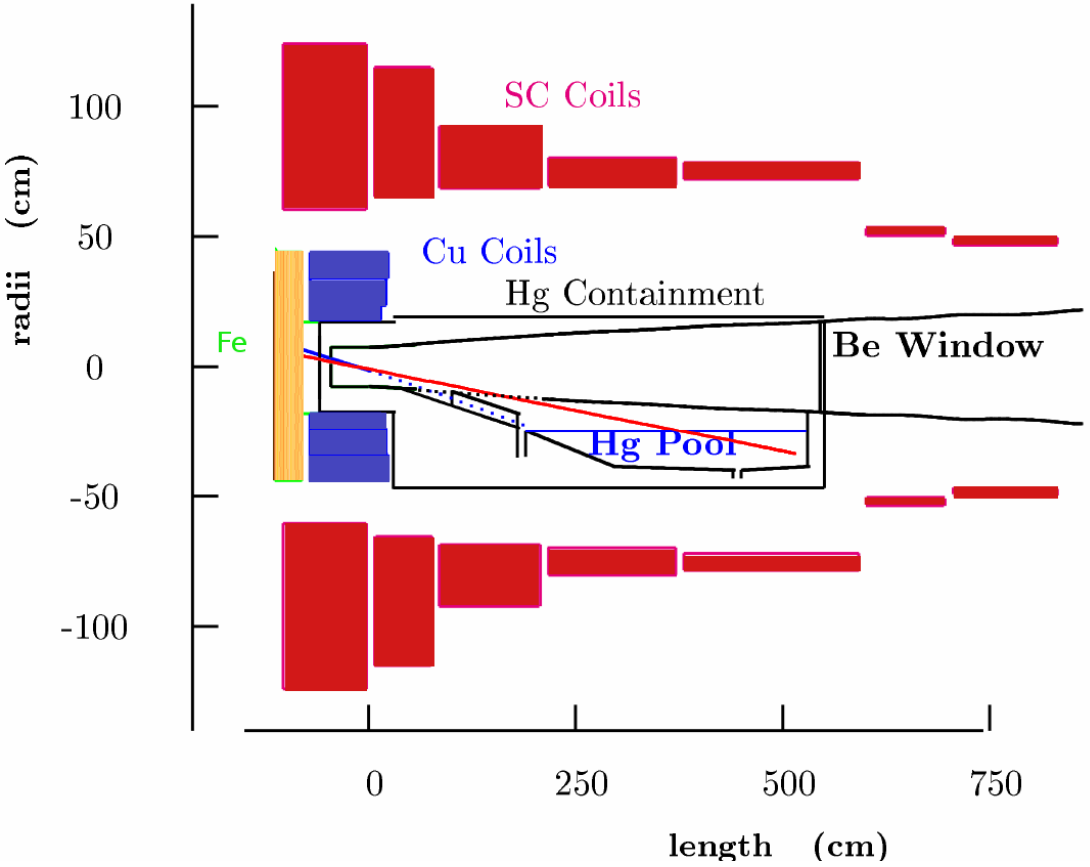
- More closely approximate NF/MC targetry concept
- Reduce jet distortion
- Nozzle/Jet Integration
- Mechanical forces and stress analysis essential

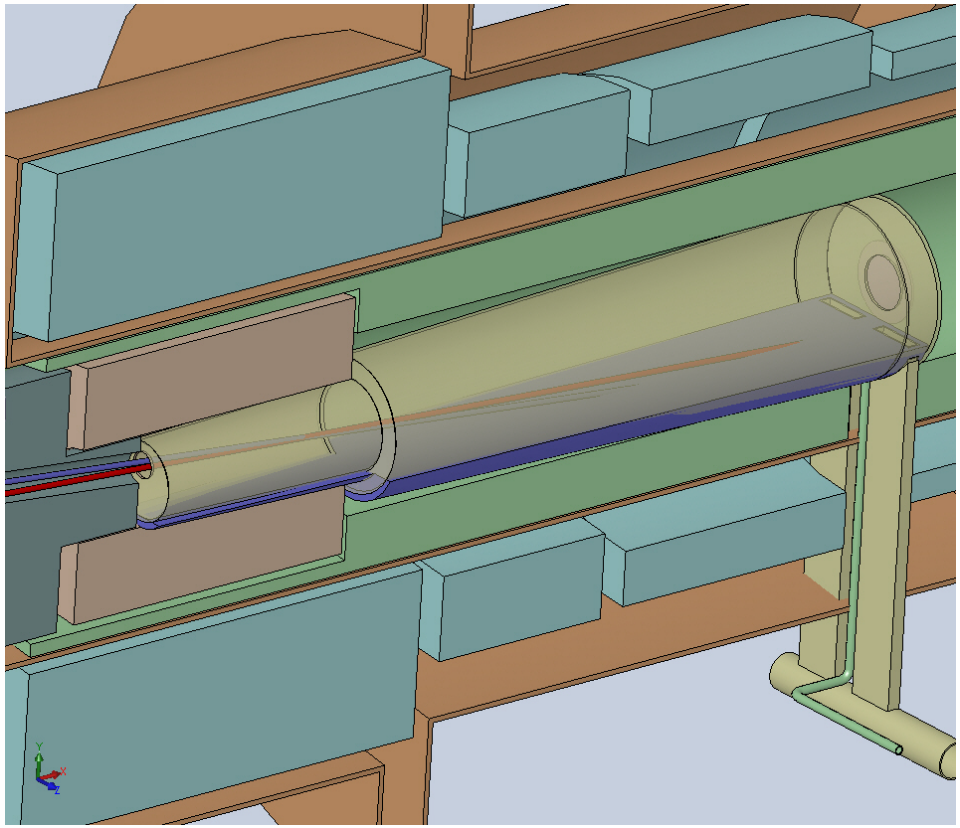




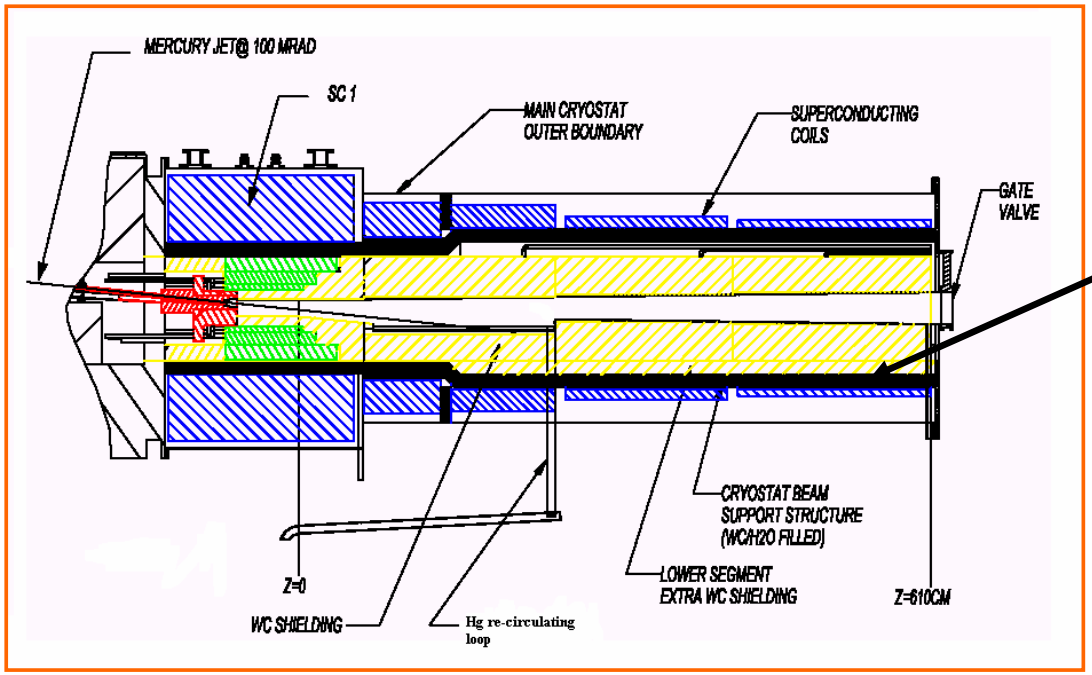
Beam Dump in Main Cryostat

- Assembly and maintenance issues require further thought
- Thermal management issues will be significant
- Simulation and hardware studies of Jet/dump splashes

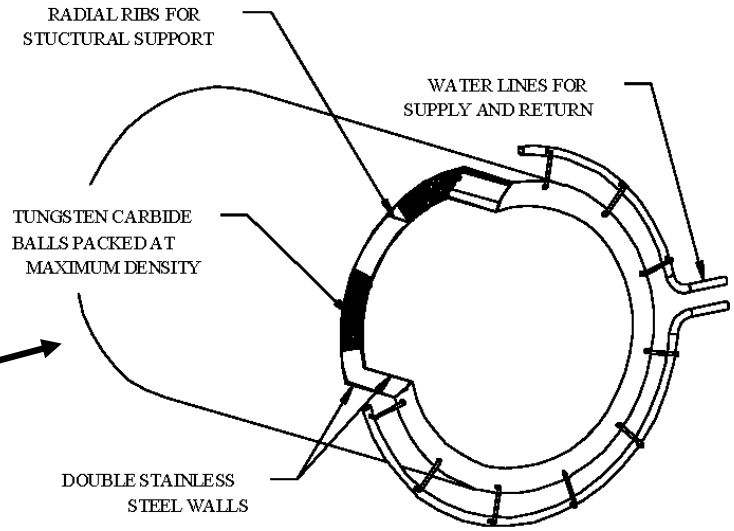




Tungsten-Carbide Shielding



Shielding



Rudimentary Concept:
Needs further development

TARGETRY DELIVERABLES

- Nozzle design for optimized Hg jet delivery
- Understanding of Jet/Dump interaction issues
- Operational experience with a continuous Hg loop
- Demonstration of impact of Fe plug on jet performance
- Design for a water-cooled tungsten-carbide shield

COST BREAKDOWN

	FY08	FY09	FY10	FY11	FY12
FTEs	1.4	1.0	1.2	1.4	1.1
SWF (K$)	310	155	183	211	182
M&S (K$)	105	100	140	185	160
Total (K$)	415	255	323	396	342