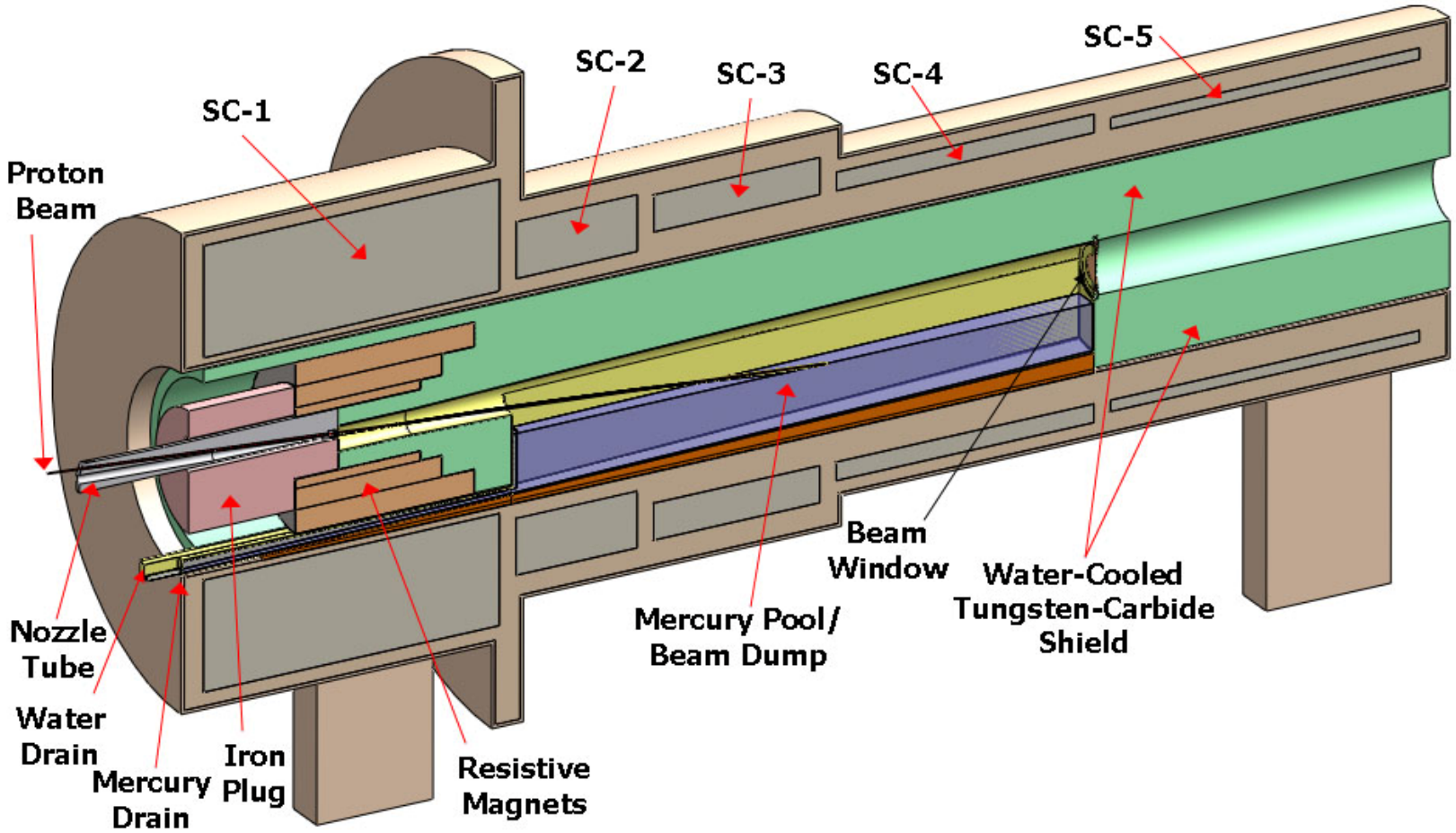
FY11 Target System Budget Proposal



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Overview

The concept of the target system for a Muon Collider was enunciated in 1995 by Palmer *et al.*

To collect π and μ of both signs, use a solenoid-magnet capture system with a free mercury jet target, and a 4-MW proton beam @ 15 Hz.

This concept is also appropriate for the target system of a Neutrino Factory based on muon beams (with a proton beam rep rate of 50 Hz).

This concept has been validated by the MERIT experiment (CERN, 2007).

However, this concept remains very conceptual, and little effort has been made to explore it in detail since Neutrino Factory Feasibility Study II (2001).

Example: Already in 1995 it was realized that the use of a high field solenoid around the target, with field tapering down to a lower value in the π/μ transport channel, would result in a reduction of the RMS emittance of the beam (cooling!).

But, no systematic study of this desirable feature has ever been performed.

In fact, only last Friday was the first plot produced that showed how the target system "cools" the π/μ beam, and by 1/3 as much as the official cooling system of the Neutrino Factory (far downstream).

$\Rightarrow$ Substantial effort remains to explore the basic concept of the target system.

It is desired that the MAP establish a program-wide baseline in the immediate future.

The target system baseline can be defined at present only as a "reasonable guess" as to the many interrelated parameters of this system.

To define a baseline that represents a detailed technical understanding of this complex system will require significant effort beyond that to date.

(Naïve cost estimate for the target system: \$1B, not \$100M)

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1. Nozzle development (SUNYSB Grad student support) 50k
   This is an ongoing commitment.
   This money goes to BNL, where is it considered M&S used for a subcontract with Stony Brook.
   It could be listed under item 2.5.1 on the spreadsheet.

2. MHD simulations (SUNYSB Grad student support) 50k [running sum = 100k]
   This is an ongoing commitment
   This money goes to BNL, where is it considered M&S used for a subcontract with Stony Brook.
   It could be listed under item 2.5.1 on the spreadsheet.

3. MERIT Analysis; target studies management 10k [running sum = 110k]
   This is for Princeton, and is something of an ongoing commitment
   It could be under 2.5.1 as "scientist."

4, Energy deposition calculations (Post-Doc) 100k [running sum = 210k]
   This is a new commitment -- for Nicholas Souchlas who is now in a temporary position sponsored by Stony Brook, paid for by BNL M&S.
   The goal is to make this a BNL Post-Doc position.
   The work by Nick would also include target optimization, and magnet configuration optimization.
   It could be under 1.2.1 as Target System Design Simulation.

5. Magnet Engineering 50k [running sum = 260k]
   This is a new commitment. We do not have a candidate identified here.
   It would probably go under 2.5.1.

6. Thermal Hydraulic Engineering 50k [running sum = 310k]
   This is a new commitment. We have in mind M&S support for the Peles group at RPI.
   It would probably go under 2.5.1.

7. Target Station Infrastructure 50K [running sum = 360k]
   This would be for ORNL, Van Graves et al., and so is something of an ongoing commitment.
   It would probably go under 2.5.1.

Total for WBS category 1 = 100k
Total for WBS category 2 = 260k