AGS Experiment E951

An R&D Program for Targetry and Capture at a Neutrino Factory and Muon Collider Source

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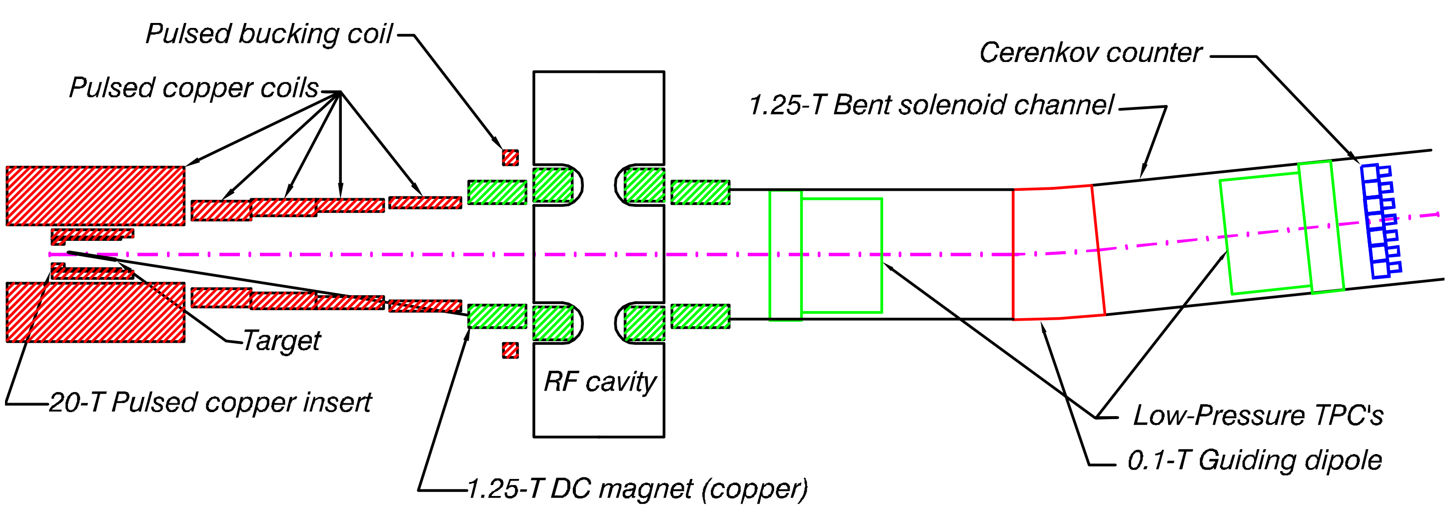

Targetry Workshop, BNL, May 5, 2000

E951 Schedule

- FY99:
  Prepare A3 area at the AGS (Step 1);
  Begin work on liquid jets, magnet and rf systems (Steps 2, 4-6).

- FY00:
  Complete A3 line (Step 1);
  Continue work on jet, magnet and rf systems (Steps 2, 4-6);
  Begin work on AGS extraction upgrade (Step 3).

- FY01:
  First test of targets in A3 (Step 1);
  Liquid jet test in 20-T magnet at NHMFL (Step 2);
  Continue work on extraction, magnet, and rf systems (Steps 3-6).

- FY02:
  Complete extraction upgrade, magnet, and rf systems (Steps 3-6);
  Test targets with 10^{14} $p$pp (Step 3);
  Begin work on pion yield diagnostics (Step 7);
  Option to study mercury dump in vertically pitched beam (Step 3.5).

- FY03:
  Beams tests of target + 20-T pulsed magnet + rf cavity (Steps 4.6);
  Complete pion detectors; test yield with low intensity SEB (Step 7).

Targetry and Capture Budgets, I

Yearly Projections (made in 1998)

Category	FY99	FY00	FY01	FY02	FY03	Total
Base Program	\$0.5M	\$1.5M	\$2M	\$2M	\$1M	\$7M
AGS Operations		\$0.2M	\$0.2M	\$0.4M	\$0.4M	\$1M
RF Power Source	\$0.05M	\$0.5M	\$1M	\$1M	\$1M	\$3.5M

Targetry FY99, Allocated

Task	ANL	BNL	LBL	Princeton	Industry	Total
Initial Target Studies		20		85		105
AGS Beamline Upgrades		100				100
Pulsed Solenoid Design		50				50
RF Systems		65	75		50	190
Simulation Studies	75			5		80
Total	75	285	75	90	50	**\$525k**

Total Targetry FY00, Allocated

Task	ANL	BNL	LBL	ORNL	NHMFL	Prin.	MSU	Total
Initial Target Studies		25				50		75
AGS Beamline Upgrades		1338						1338
Magnet Systems		240			25	40		305
RF Systems		295	75					370
Simulation Studies	80					10		90
Target Station				50				50
Radiation Damage							20	20
Carryover		−100						−100
Total	80	1798	75	50	25	100	20	**$2148k**

FY00 Targetry Allocation: Details

1. **Initial Target Studies** **$75k**
    - Remote positioner for target box (BNL) $25k
    - Target box, targets, cameras (Princeton) $50k
2. **AGS Beamline Upgrades** **$1338k**
    - Labor (11,000 hours, BNL) $1100k
    - Beamline Instrumentation (BNL) $120k
    - Radiation Safety (BNL) $38k
    - 6-Bunch kicker design (BNL) $80k
3. **Magnet Systems** **$305k**
    - Mech. engineer (BNL) $170k
    - 1/4 Mech. engineer (Princeton) $40k
    - 1/6 Mech. engineer (NHMFL) $25k
    - Design of 5 MW magnet power supply (BNL) $70k

4. **RF Systems** **$370k**

   - Recommissioning of the 8973 power supplies (LBL) . $75k
   - 1 1/2 RF engineer (BNL) $255k
   - Materials (BNL) $40k

5. **Simulation Studies** **$90k**

   - (ANL) $80k
   - (Princeton) $10k

6. **Target Station Studies (ORNL)** **$50k**

7. **Radiation Damage Studies (MSU)** **$20k**

8. **Total** **$2248k**

FY01 Targetry Request: Details

1. **Initial Target Studies** **$200k**
   - Engineering support for A3 target station (BNL) ... $50k
   - Mercury jet for BNL/NHMFL tests (Princeton) $50k
   - [Carbon target studies (BNL, ORNL, LANL) ..... $100k]
2. **AGS Operations: 3 weeks, A3 + linac costs $200k**
3. **AGS Beamline Upgrades** **$900k**
   - Labor (1,000 hours, BNL) $100k
   - 6-Bunch kicker fabrication (BNL) $800k
4. **Magnet Systems** **$1200k**
   - Mech. engineer (BNL) $170k
   - 1/2 Mech. engineer (NHMFL) $80k
   - 1/4 Mech. engineer (Princeton) $40k
   - Designer (BNL) $110k
   - Fabrication of 5 MW magnet power supply (BNL +) $400k
   - Fabrication of pulsed & DC magnet coils (BNL +) . $400k

5. **RF Systems** **$1335k**

- Shipping of 8973 rf gear from LBL to BNL $20k
- Materials for 8973 power source (BNL) $100k
- 1 1/2 RF engineer (BNL) $255k
- Mech. engineer (BNL) $160k
- 2 × 1/2 Technician (BNL) $100k
- Fabrication of the 70 MHz rf cavity $400k
- [RF switch R&D (BNL) . . . . $50k]
- [Industrial development of 10-50 MW power sources $250k]

6. **Simulation Studies** **$360k**

- 1/2 FTE (ANL) $80k
- 1/2 FTE (BNL) $80k
- [1/2 FTE (BNL) . . . . $80k]
- [1/2 FTE (ORNL) . . . . $80k]
- 1/4 FTE (Princeton) $40k

7. [Target Station Studies (ORNL) . . . . $100k]

8. **[Neutronics . . . . $150k]**

   - [Radiation Damage Studies (MSU) . . . . $50k]
   - [Neutron dosimetry studies in A3 (BNL+) . . . . $100k]

9. **Total $4435k**

   [Items in brackets are beyond the E951 base program]

   [Total for items beyond the base program $810k

Summary of FY01 Targetry Budget, Requested

Task	ANL	BNL	ORNL	NHMFL	Prin.	MSU	Ind.	Total
Initial Target Studies		50	100		50			200
AGS Operations		200						200
AGS Beamline Upgrades		900						900
Magnet Systems		1080		80	40			1200
RF Systems		1085					250	1335
Simulation Studies	80	160	80		40			360
Target Station			100					100
Neutronics		100				50		150
Total	80	3575	280	80	140	50	250	**$4435k**

Comments on the FY01 Targetry Budget Request

1. Of the \$4435k requested, \$810k are for intiatives beyond the E951 base program.
2. Support for Neutronics may be available from the NSF.
3. Support for AGS Operations may be available from DOE Facilities Operations.
4. Support for the AGS kicker upgrade may be available from the LANL Proton Radiography project.
5. Support for industrial development of rf power sources might be available from DOE BES or elsewhere.
6. Candidates for support by other than DOE Advanced Accelerator Projects total \$1400k.