The High-Power Target Experiment at CERN

Muon Collaboration Meeting

LBNL

February 16, 2005

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Brookhaven National Laboratory

Muon Collaboration

Proposal to Isolde and nToF Committee

CERN-INTC-2003-033
INTC-I-049
26 April 2004

A Proposal to
the ISOLDE and Neutron Time-of-Flight Experiments
Committee

Studies of a Target System for a 4-MW, 24-GeV Proton Beam

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Local Contact: H. Haseroth

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Participating Institutions

1) RAL
2) CERN
3) KEK
4) BNL
5) ORNL
6) Princeton University

Proposal submitted April 26, 2004

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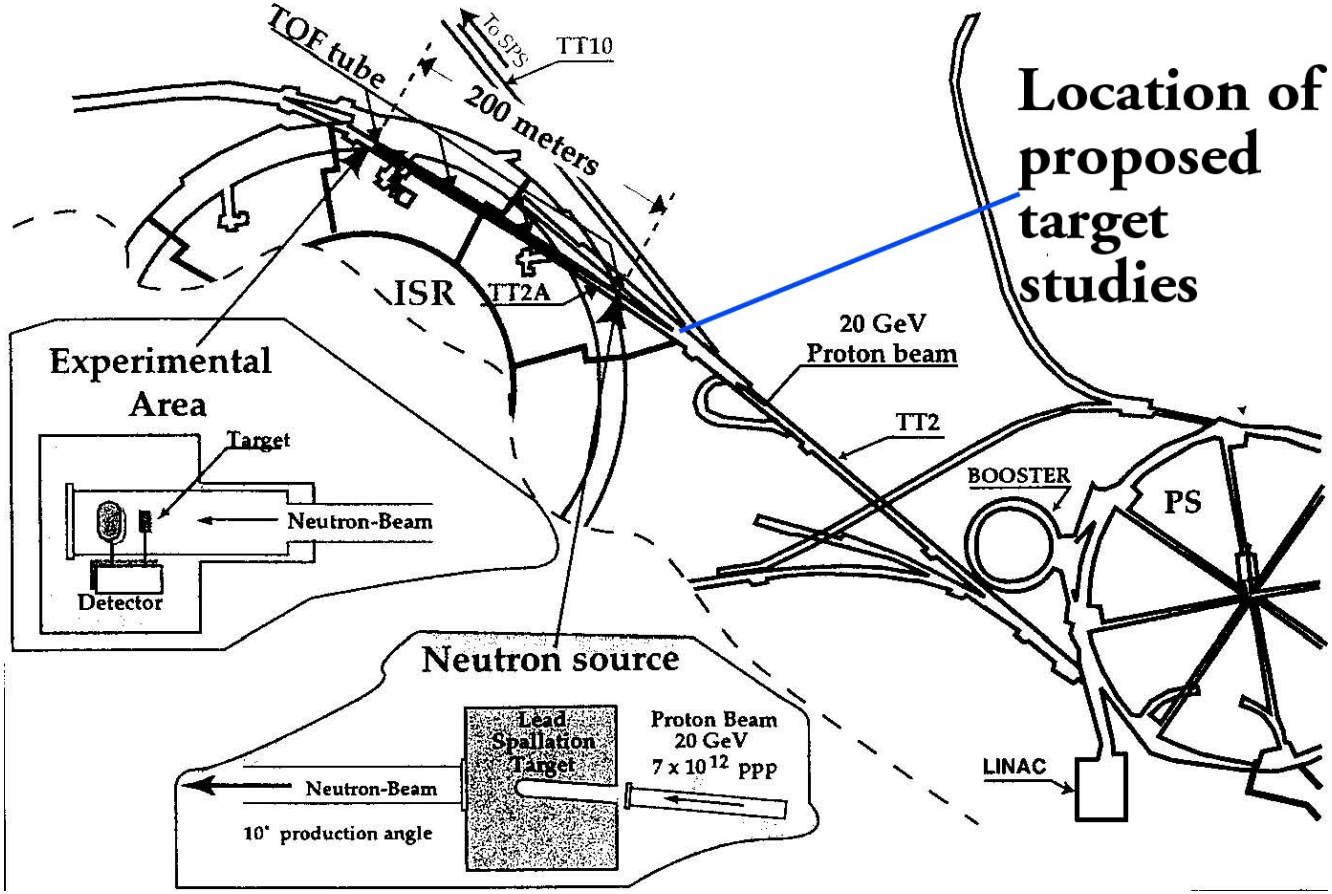
Target Test Site at CERN



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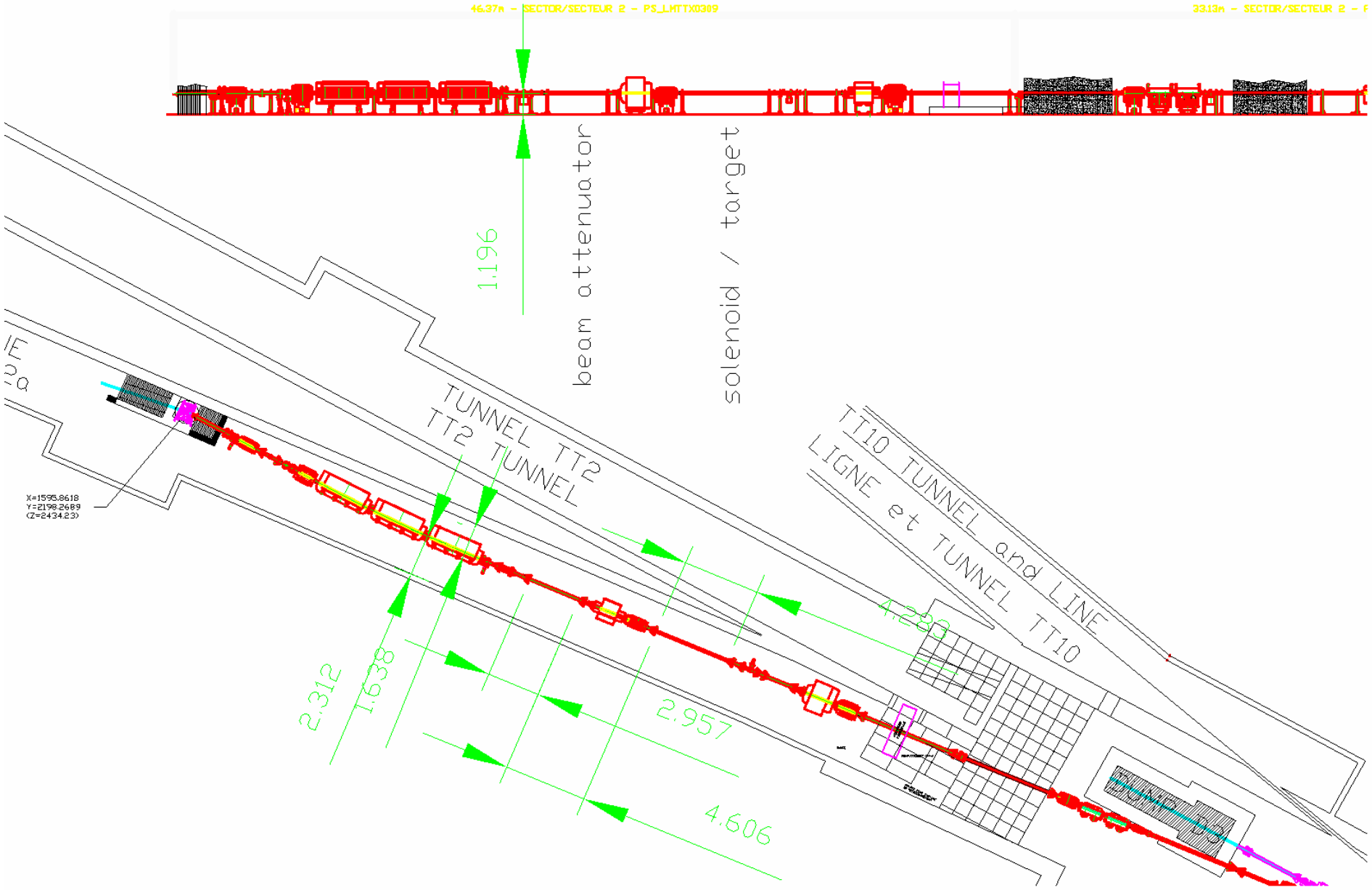

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The Experimental Installation Point

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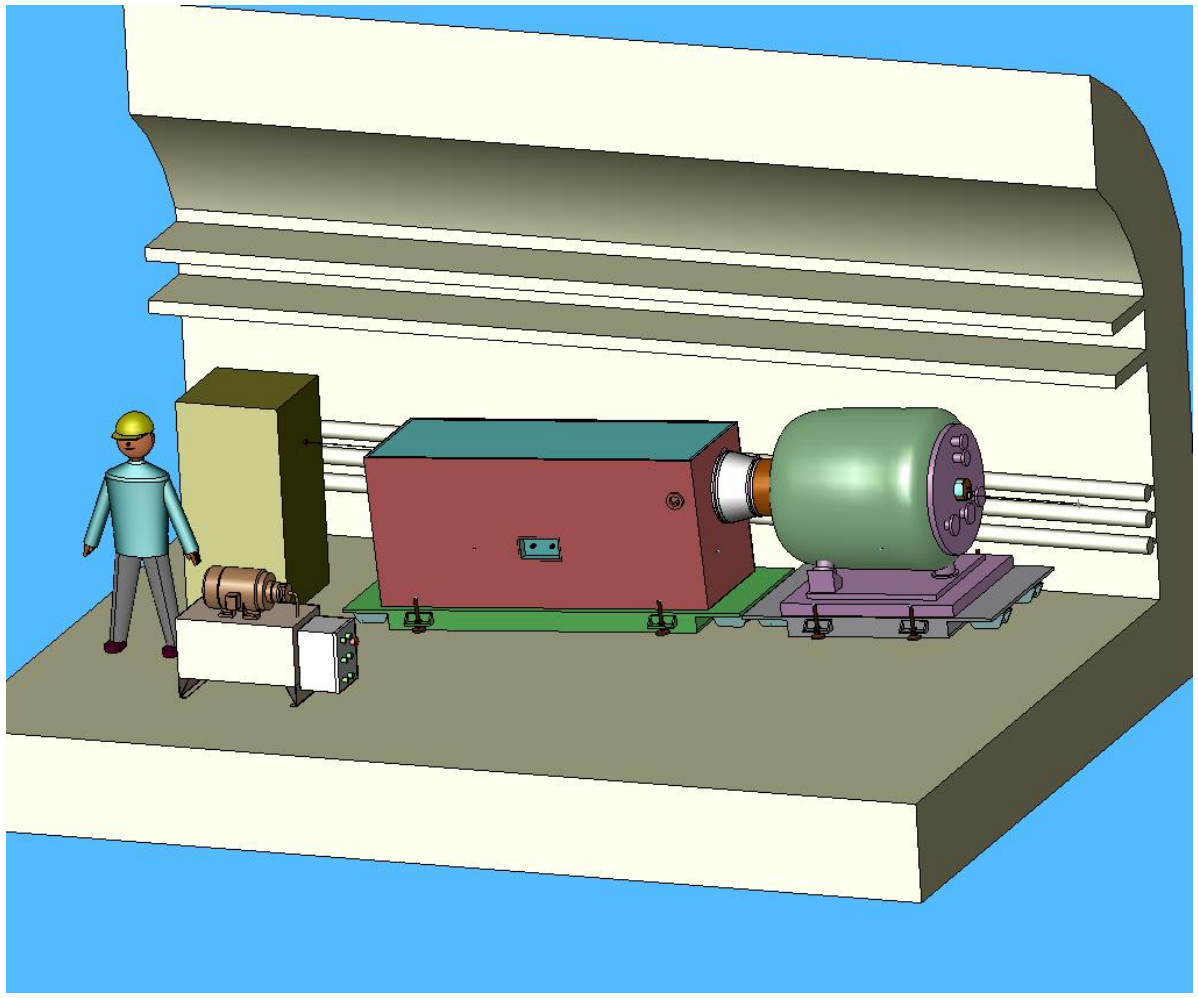
The Footprint of the Experiment



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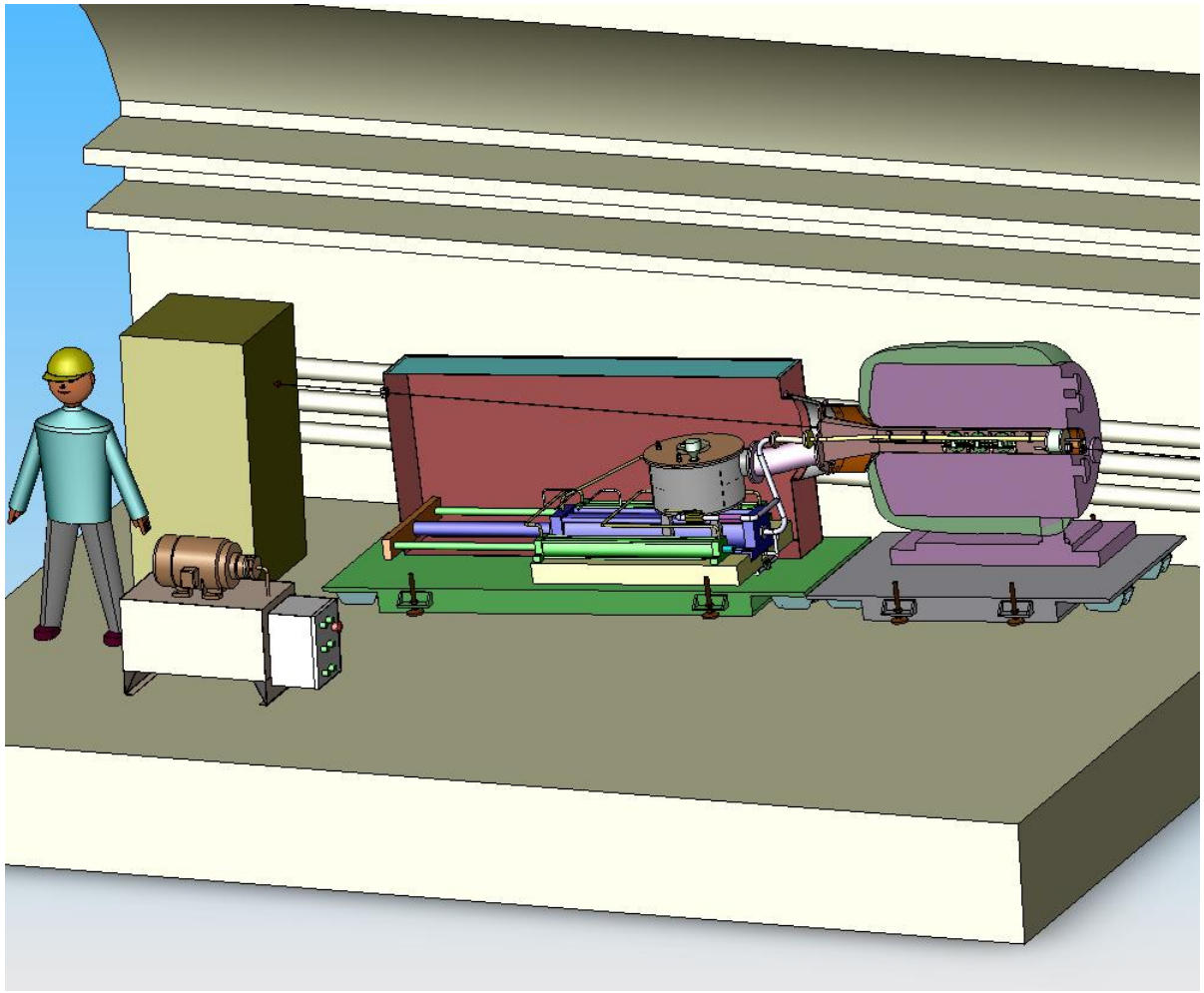
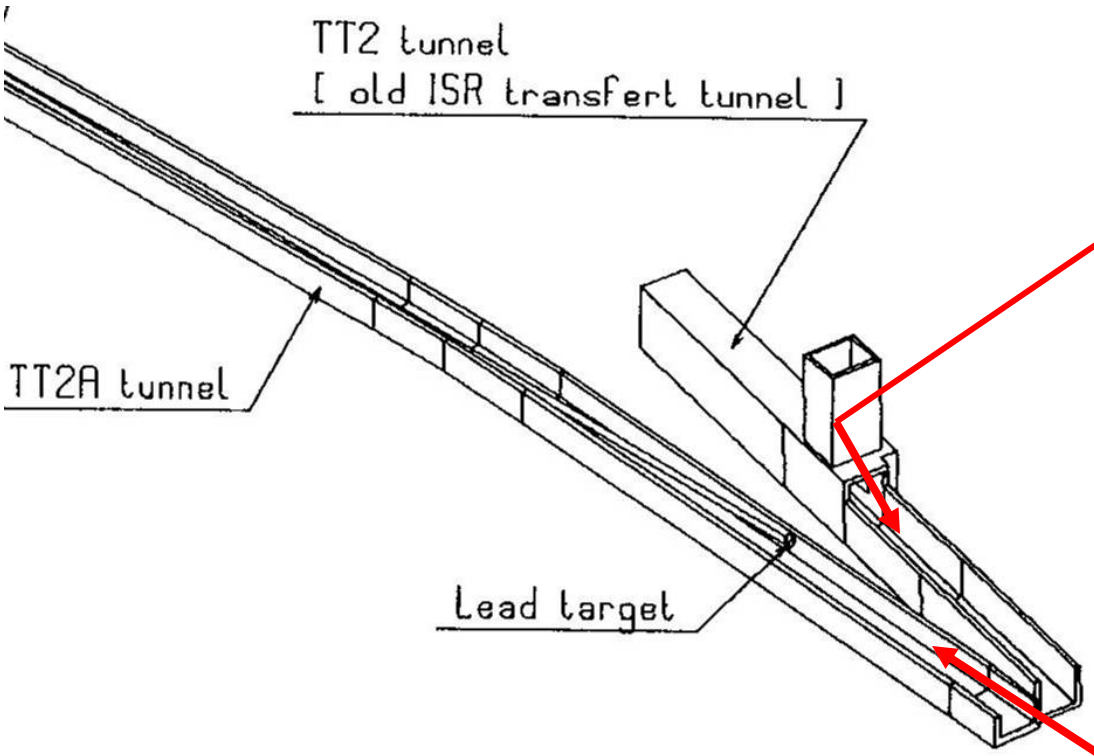
Hg Jet System Layout



The TT2 Tunnel Complex



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Surface above the ISR

Two 18kV sub-stations

Access Route

One 18kV Sub-station

Run plan for PS beam spills

Our Beam Profile request allows for:

- Varying beam charge intensity from 5 (7) TP to 20 (28) TP
- Studying influence of solenoid field strength on beam dispersal (B_o from 0 to 15T)
- Vary beam/jet overlap
- Study possible cavitation effects by varying PS spill structure—Pump/Probe

Charge	Bucket Structure	Bo	Beam Shift	Number of Shots
4 x 5TP	1-2-3-4	0	0	2
4 x 5TP	1-2-3-4	5	0	2
4 x 5TP	1-2-3-4	10	0	2
4 x 5TP	1-2-3-4	15	0	2
4 x 5TP	1-2-3-4	15	+5mm	2
4 x 5TP	1-2-3-4	15	+2.5mm	2
4 x 5TP	1-2-3-4	15	-2.5mm	2
4 x 5TP	1-2-3-4	15	-5mm	2
1 x 5TP	1	15	0	2
2 x 5TP	1-2	15	0	2
3 x 5TP	1-2-3	15	0	2
4 x 5TP	1-2-3-5	0	0	2
4 x 5TP	1-2-3-5	15	0	2
4 x 5TP	1-2-3-6	0	0	2
4 x 5TP	1-2-3-6	15	0	2
4 x 5TP	1-2-3-7	0	0	2
4 x 5TP	1-2-3-7	15	0	2
4 x 5TP	1-2-3-8	0	0	2
4 x 5TP	1-2-3-8	15	0	2
Total				

Peak Energy Deposition

Neutrino Factories

Hg target; 1 MW 28 GeV proton beam; 15 Hz

1cm diameter Hg jet ; 1.5mm x 1.5mm beam spot 100 J/g

Hg target; 4 MW 2.2 GeV proton beam; 50 Hz

2cm diameter Hg jet; 3mm x 3mm beam spot 180 J/g

E951

Hg target; 4 TP 24 GeV proton beam;

0.3mm x 0.9 mm rms beam spot 80 J/g

CERN PS (projected)

Hg target; 28 TP 24 GeV proton beam

1.2mm x 1.2 mm rms beam spot 180 J/g

High-power Target Experiment

Budget agreed to by the Collaboration Technical Board on Sept. 22, 2004

Subject to continued flat funding from US DOE

	FY05	FY06	FY07	Total
Magnet Systems				
Solenoid Testing	100		100	200
Cryogenics	25	325	200	550
Power Supply	340			340
PS Installation			50	50
Decommission			30	30
Hg Jet				
System Integration	85	75	50	210
Nozzle R&D	25	25		50
Optics		25		25
Fabrication		40		40
Decommission			30	30
Project Management	53	75	40	168
Simulations	50	50	50	150
Experiment Operations			50	50
Total	678	615	600	1893

Reports on Target Experiment

CERN perspective	Helmut Haseroth
CERN infrastructure	Adrian Fabich
The Pulsed Solenoid	Peter Titus
The Cryogenic System	Yuri Ivanyushenkov (Paul Drumm)
The Hg Jet System	Van Graves
The Hg Jet Nozzle tests	Kirk McDonald
Simulations	Roman Samulyak