



The High-power Target Experiment at CERN

Muon Collaboration Meeting

LBL

February 16, 2005

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**

J. Roger J. Bennett¹, Luca Bruno², Chris J. Densham¹, Paul V. Drumm¹,
T. Robert Edgecock¹, Tony A. Gabriel³, John R. Haines³, Helmut Haseroth²,
Yoshinari Hayato⁴, Steven J. Kahn⁵, Jacques Lettry², Changguo Lu⁶, Hans Ludewig⁵,
Harold G. Kirk⁵, Kirk T. McDonald⁶, Robert B. Palmer⁵, Yarema Prykarpatsky⁵,
Nicholas Simos⁵, Roman V. Samulyak⁵, Peter H. Thieberger⁵, Koji Yoshimura⁴

Spokespersons: H.G. Kirk, K.T. McDonald

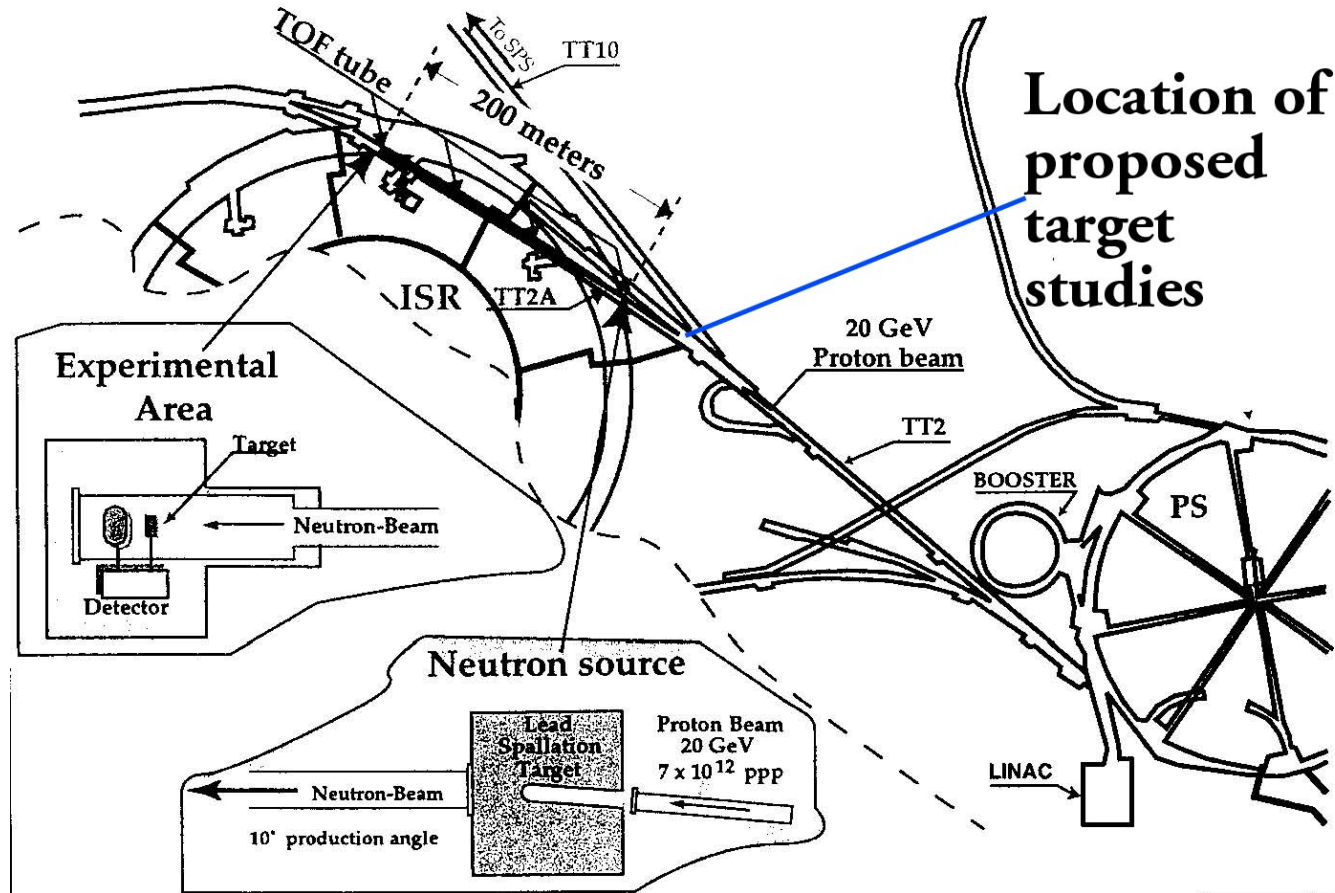
Local Contact: H. Haseroth

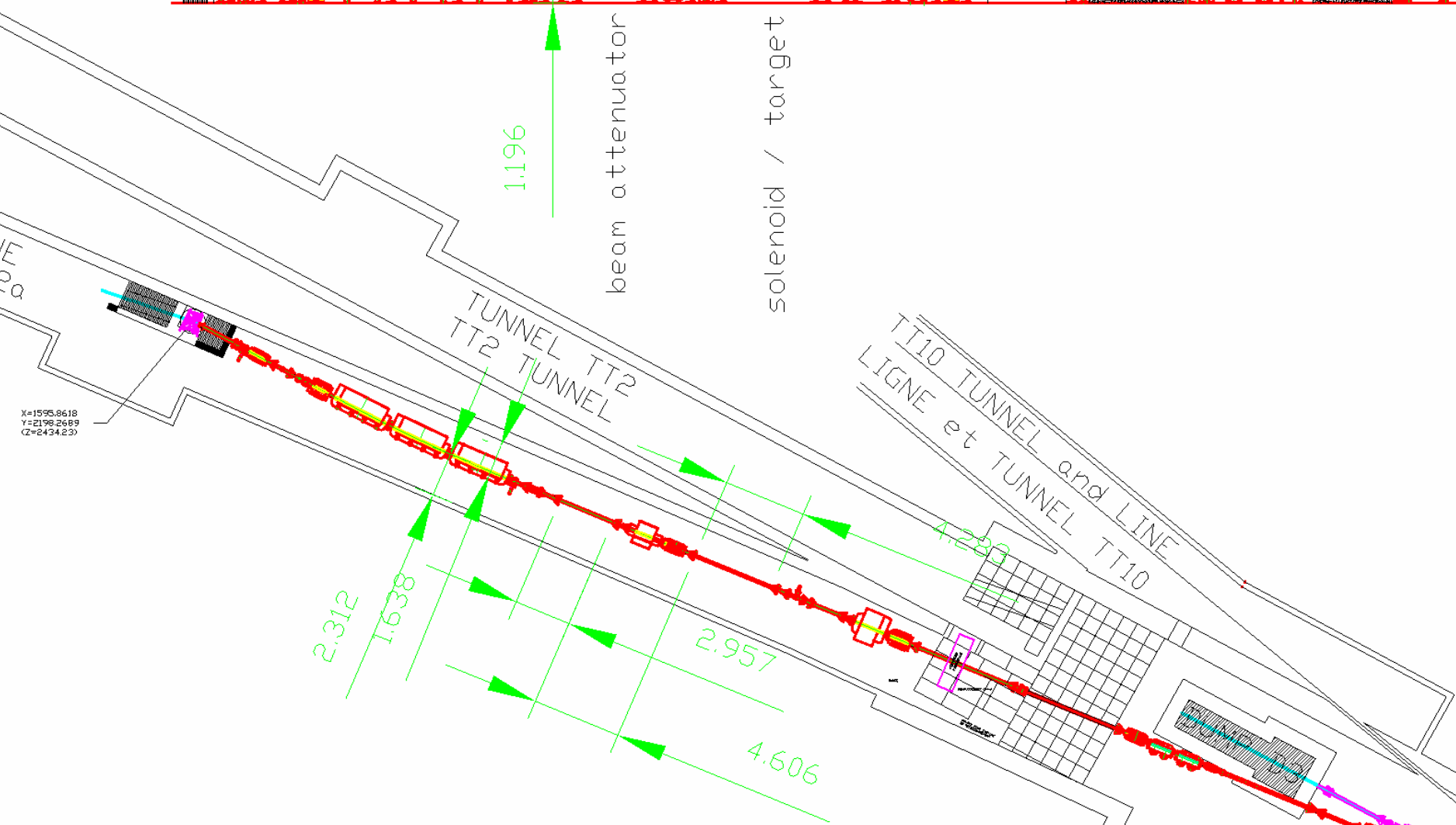
Participating Institutions

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

Proposal submitted April 26, 2004

Target Test Site at CERN



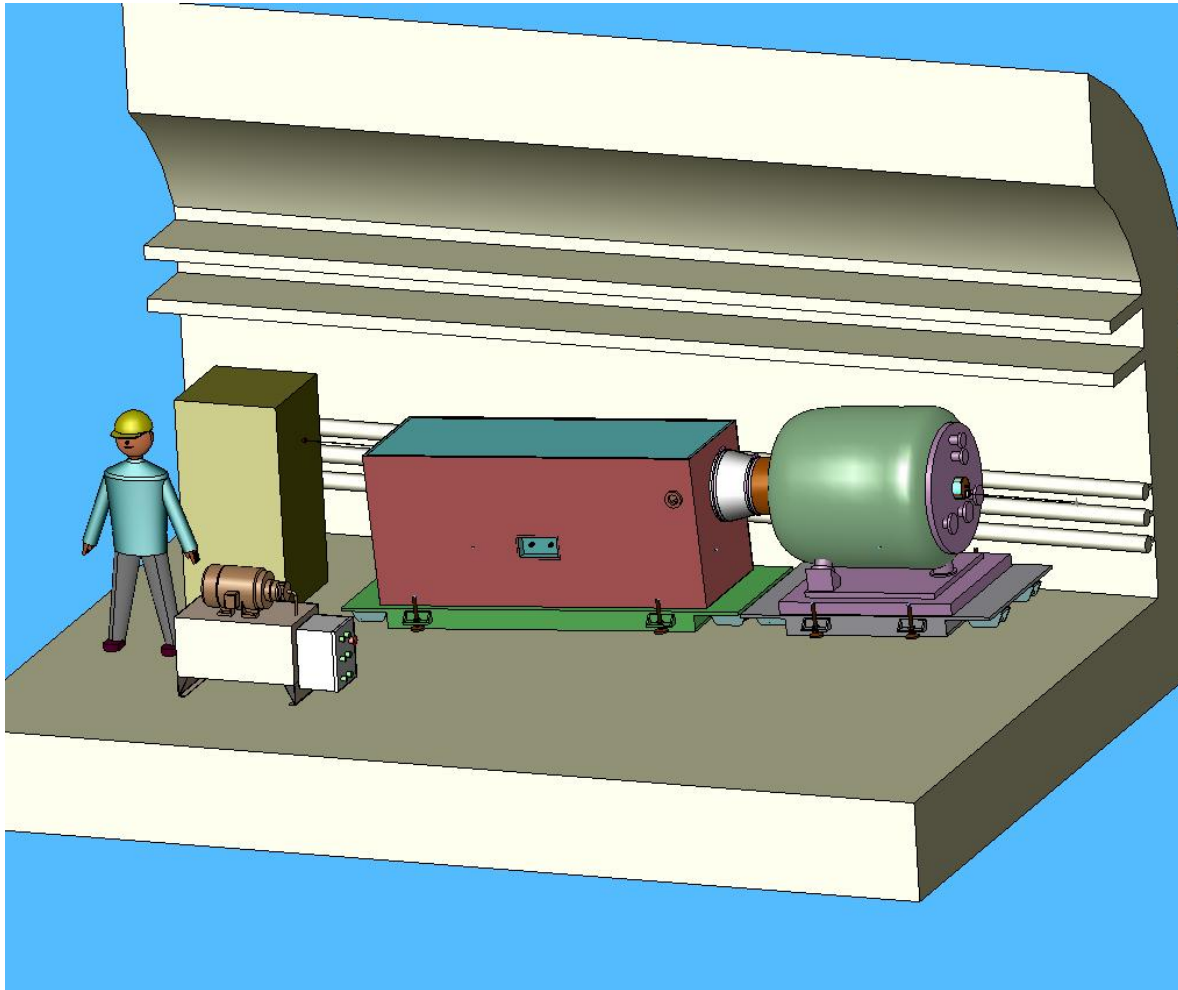


X=1595.8618
Y=2198.2689
Z=2434.23

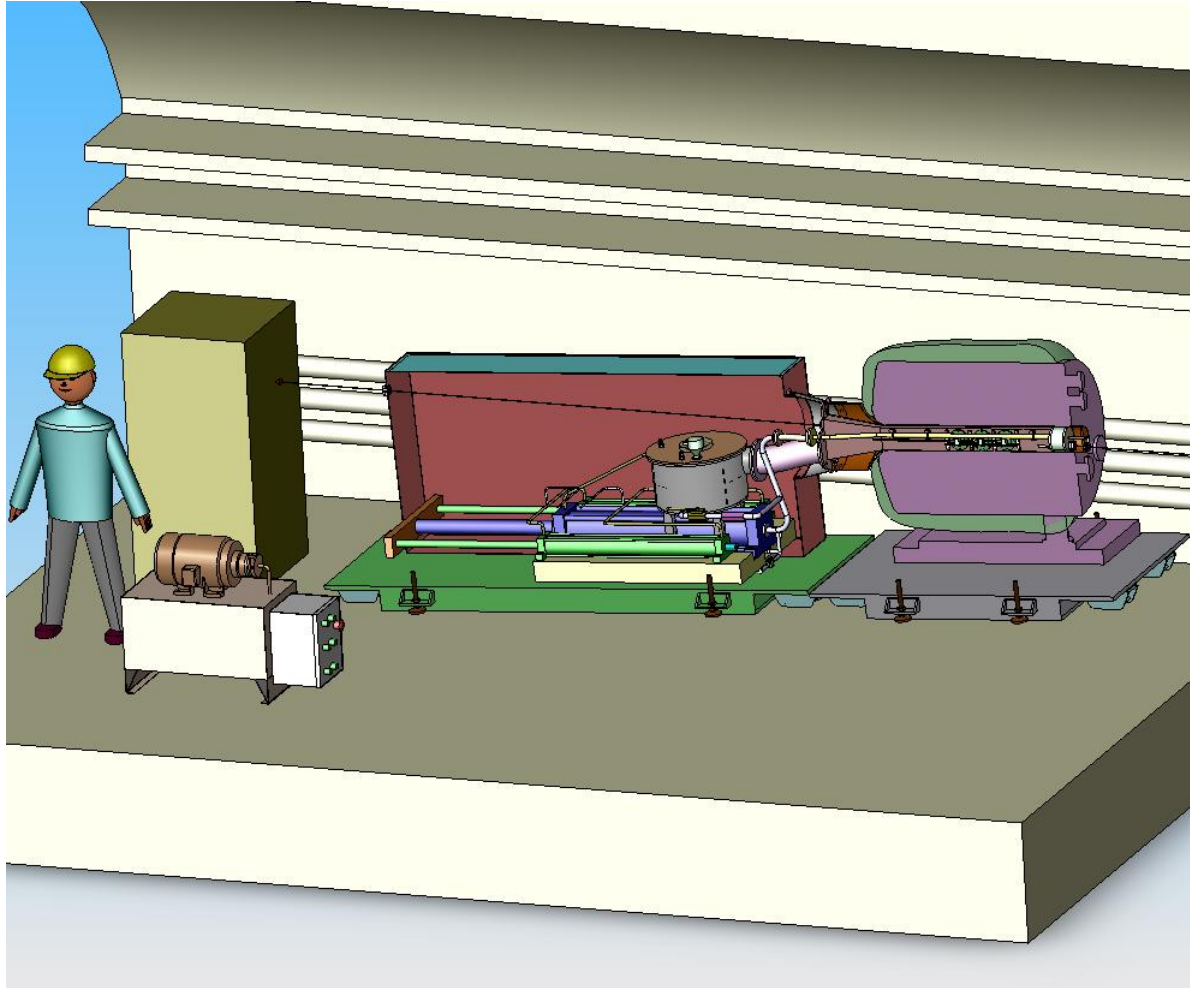
The Experimental Installation Point



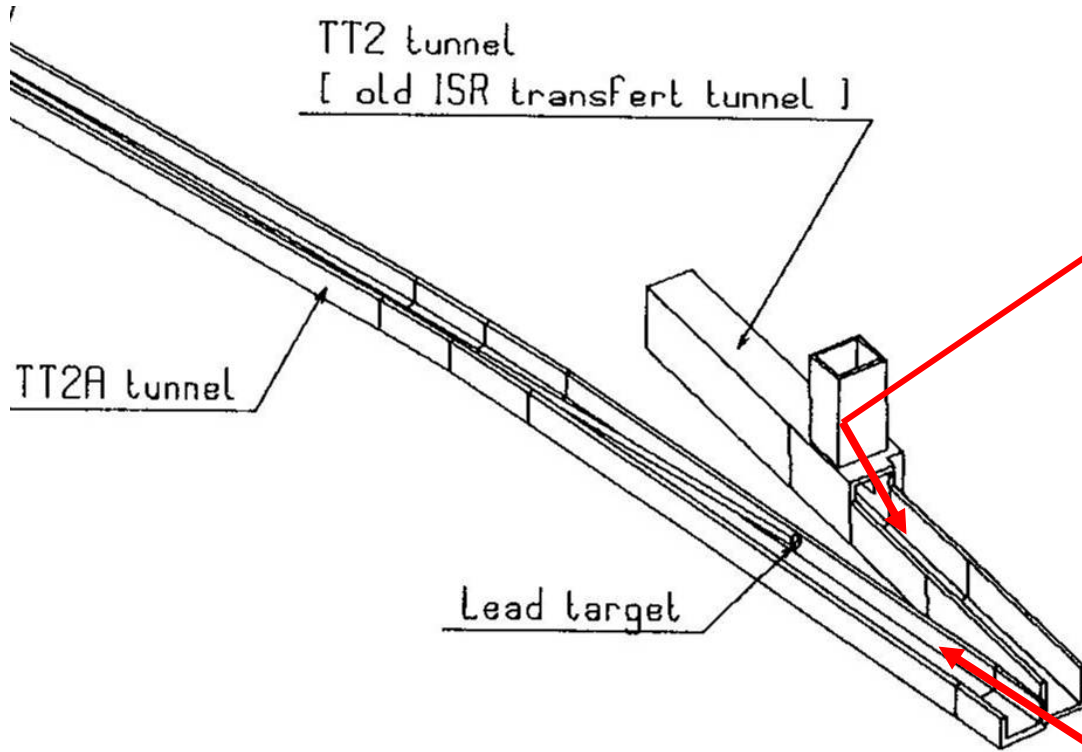
The Footprint of the Experiment



Hg Jet System Layout

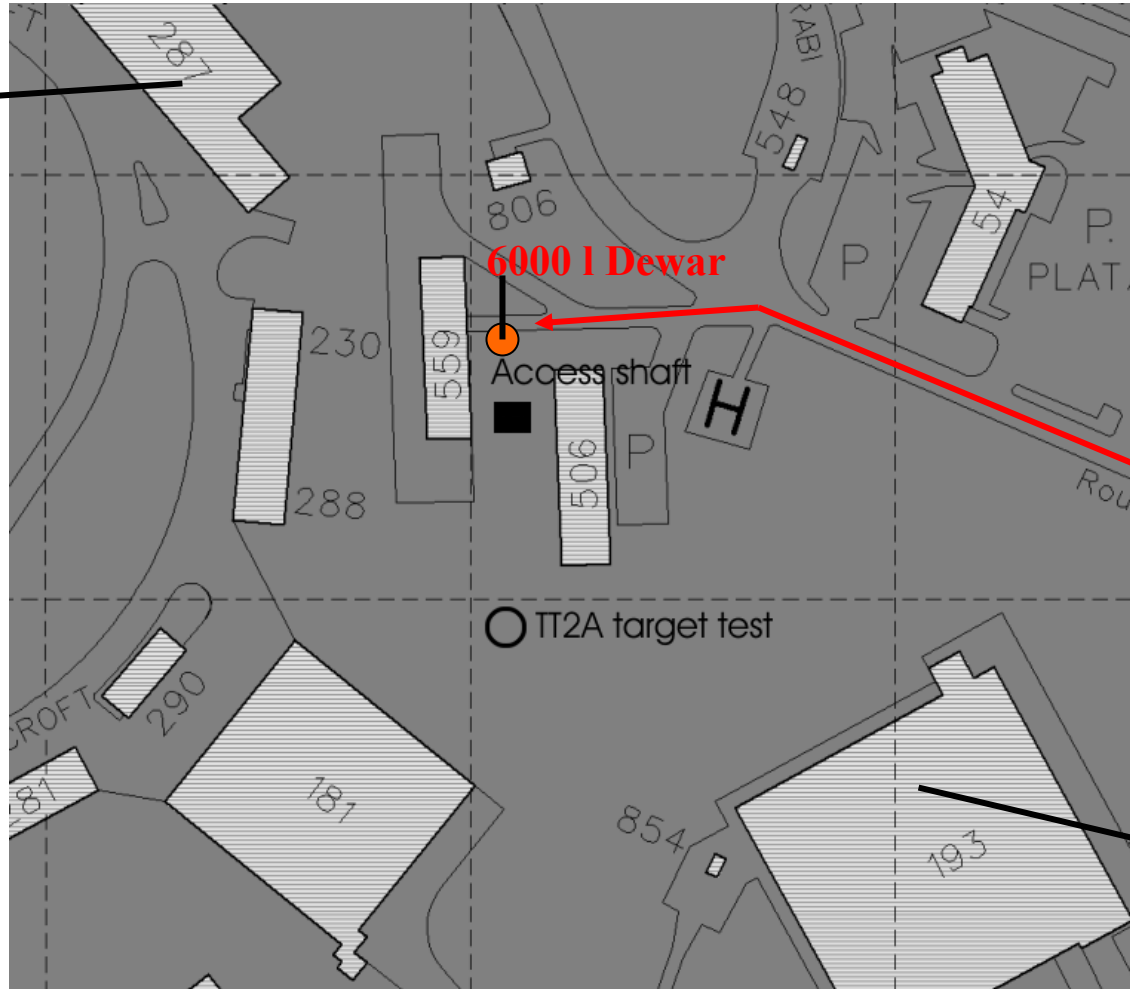


The TT2 Tunnel Complex



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_0 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