Muon Collaboration

Summary
for proposal of TT2A target test

H.Kirk, A.Fabich

March 2004 week 9

http://proj-hiptarget.web.cern.ch

Webpage for minutes/Credits

Summary of meetings 31.March - 2.April 2004 at CERN

Wednesday

- afternoon: Power, 14:00, room 304-1-001 B, minutes — C.Martins AB/PO

Thursday

- morning: PS beam, 10:00, room 6 2-002, minutes — M.Giovannozzi, C.Carli, S.Hancock AB/ABP-RF
- afternoon: Safety & Radioprotection, 14:00, room CERN-PUB (4 S-013), minutes

Friday

- morning: Cryogenics, 9:00, building 165 (meeting at 9:00 in bat. 252) — F.Haug, AT/ECR
- afternoon : General & Physics, 14:00, room 304-1-001 B

Power supply

Item	investment kChF	man-months
BATTERY solution		
purchase batteries	90	
power supply 50 kW	100	3
Charge/switch system	80 ??? (R&D needed)	
Cabling	25	
Commissioning + safety		4
TOTAL batteries	300	7
RENTAL ALICE TYPE		
transport		3
feasibility + commissioning		3
rental fee	0?	
cables	75	
TOTAL rental	75	6
PURCHASE ALICE TYPE		
purchase Alice type	350	
installation	10	
Feasibility + contract + commissioning		9
cabling	75	
TOTAL purchase	440	9

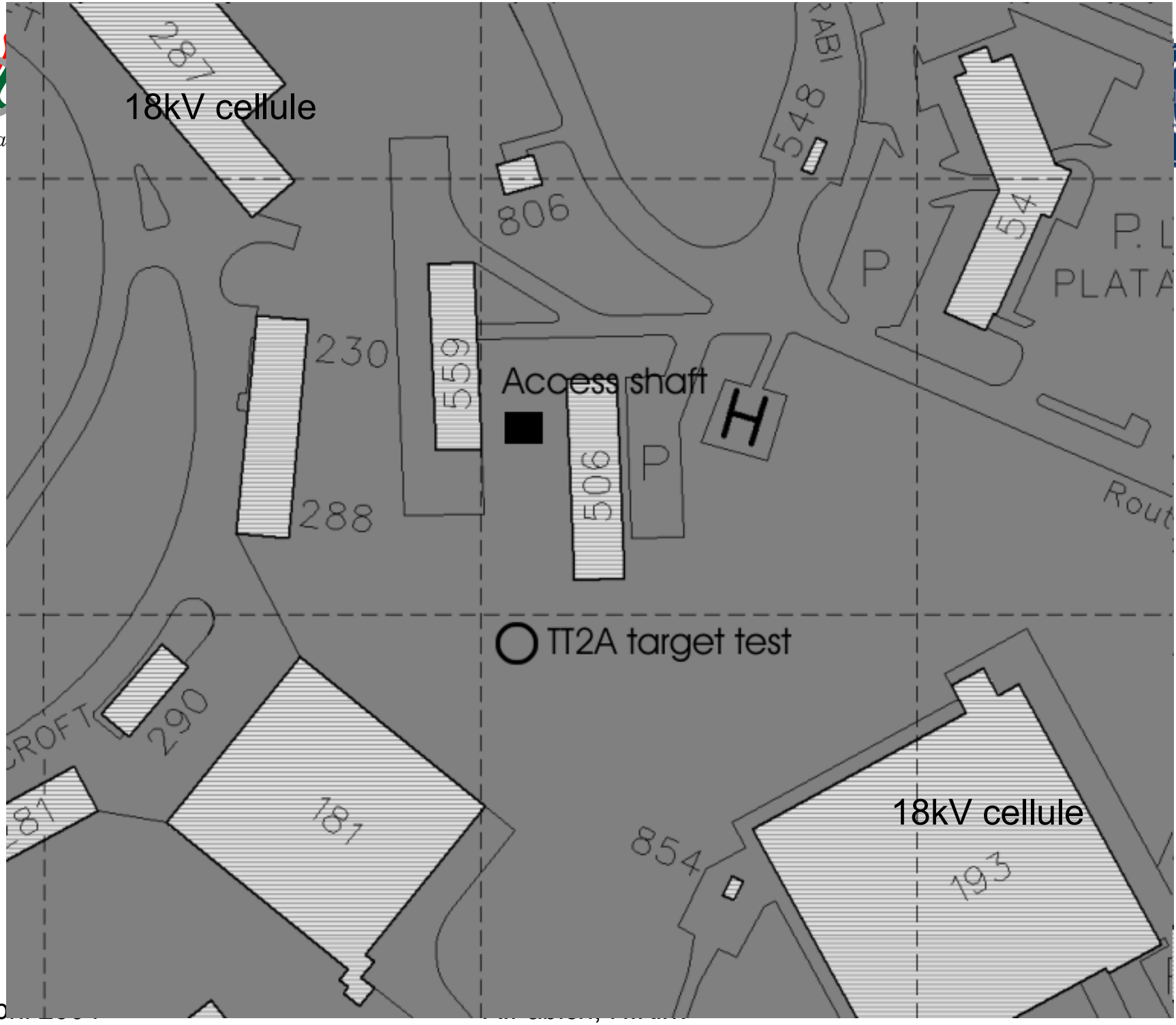
1. Batteries
   waste management? Reuse for trucks?
2. Rent power supply ALICE
   LHCb excluded
   In contact with ALICE
3. Purchase power supply ALICE/LHCb
   resell? To BNL/JPARC/CERN

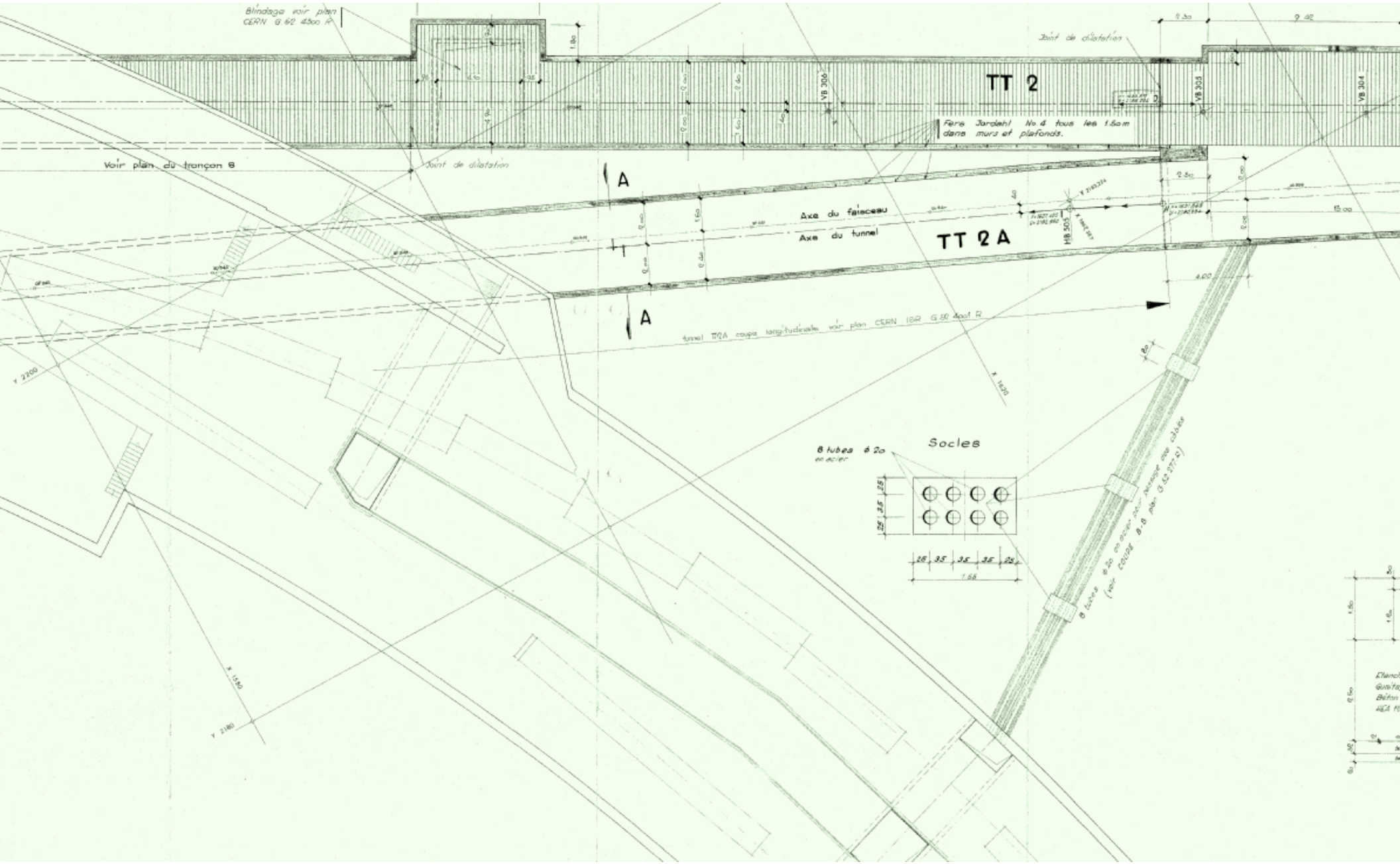
All three possibilities are technically possible!

Installation:

- ISR tunnel
- access to TT2A through gallery
- no activation of material

See on the web


18kV cellule
287
806
548
54
P
P. L
PLATA
230
559
Access shaft
H
506
P
288
Rout
TT2A target test
CROFT
290
181
854
193
18kV cellule

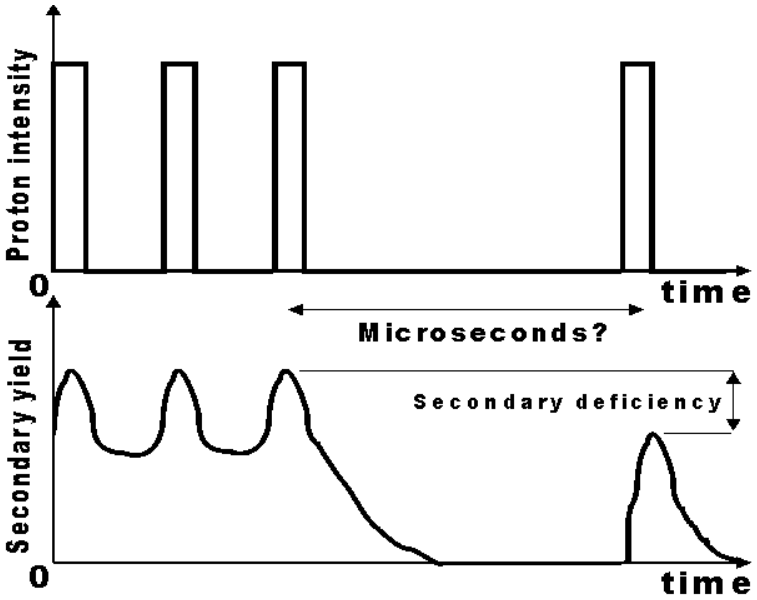


2.April 2004

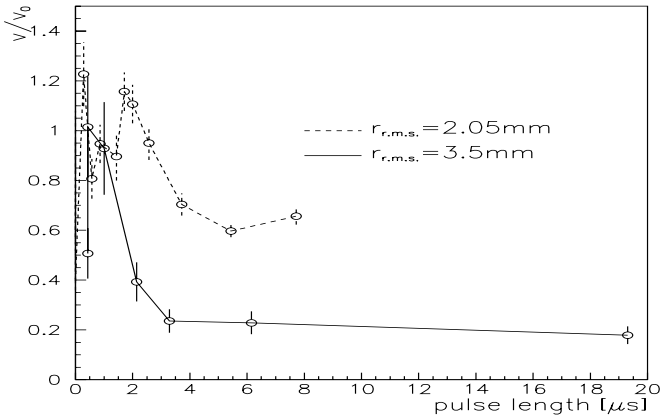
A.Fabich, H.Kirk

PS beam

- momentum p = 20 GeV/c
  due to compatibility with nToF and kicker
- 4 bunches within 8 PS buckets at our digression
- t_{pulse}= 0.5-2 microseconds
- t_{bunch}=50ns full length, peak-to-peak 250 ns
- pulse length below 1 microsecond needs 2 man-months to develop
  - apart from this effort needed is in the order of days to week
  - money: 0 kChF



Pump-Probe method
for cavitation studies



2.April 2004

A.Fabich, H.Kirk

Cryogenics

Solution towards TT2A and “permanent” LN2 supply (fixed dewar)

Responsibility in US: solenoid, controls, DVB

FH is advising

- FH provided:
  - Schematic flow chart
  - List of recuperated material
    - 6000 l dewar
    - Cryogenic lines (bat 180: 4x25 m simple, 2x50 m shielded)
    - Heater
    - Vacuum pump ROOT

    - Manpower: 1.5 FTE*years
    - 50 kChF (for small parts)

TT2A preliminary equipment proposal

- **Process control and instrumentation**
- 1) UNICOS (Schneider) ?, ABB ?, LabView ?
- - control from distance
- - proposed is ISR building 230 or 288 from which
- 2) Instrumentation in conformity with CERN standards

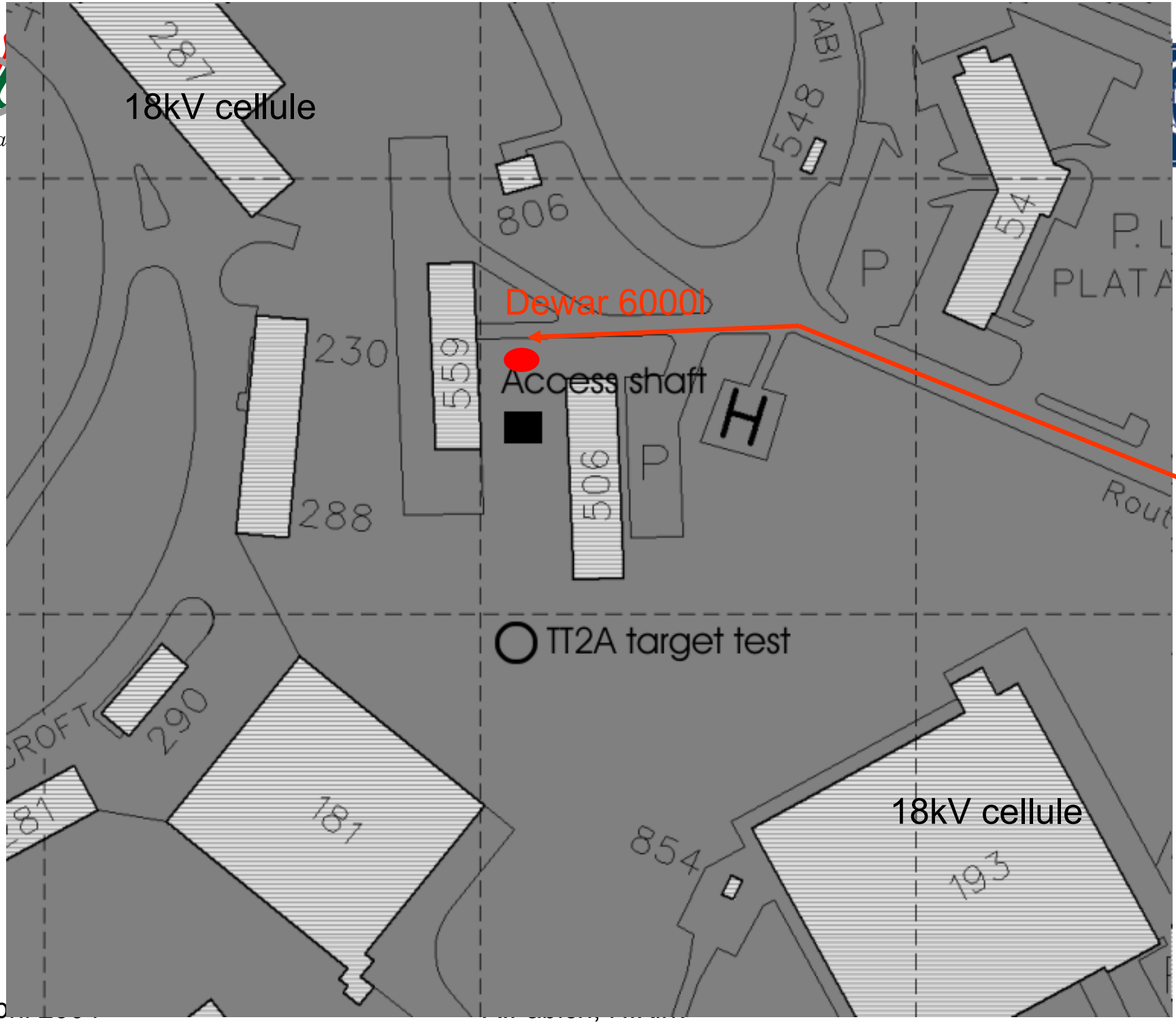
US

- **Equipment to be cooled**
- 1) Pulsed magnet
- **Proximity equipment**
- 1) DVB valve box -feed valve with level control
- -by-pass valve of TFL before recooling
- -drain valve
- -pumping line valve
- -valve for nitrogen gas out
- -temp sensors
- -flow meter

- 2) vacuum pump for insulation vacuum of magnet
- 3) vacuum pump for reducing pressure in bath
- 4) heat exchanger or el. heater
- **Intermediate Infra**
- 1) transfer line for cooling and filling
- 2) exhaust for cold nitrogen gas during cooling and filling
- 3) pump line (warm)
- **External Infra**
- 1) LN2 reservoir next to vertical shaft

CERN

- SHOW HARD-COPY of FLOW CHART


18kV cellule
Dewar 6000l
Access shaft
TT2A target test
18kV cellule
Access route for LN2 delivery

Manpower

- Not mentioned so far:
  - Physic studies
  - Project management

Jet Chamber (top view)

- Basic principle for all designs:

✓ inner chamber for jet

Connected by

Straight nozzle

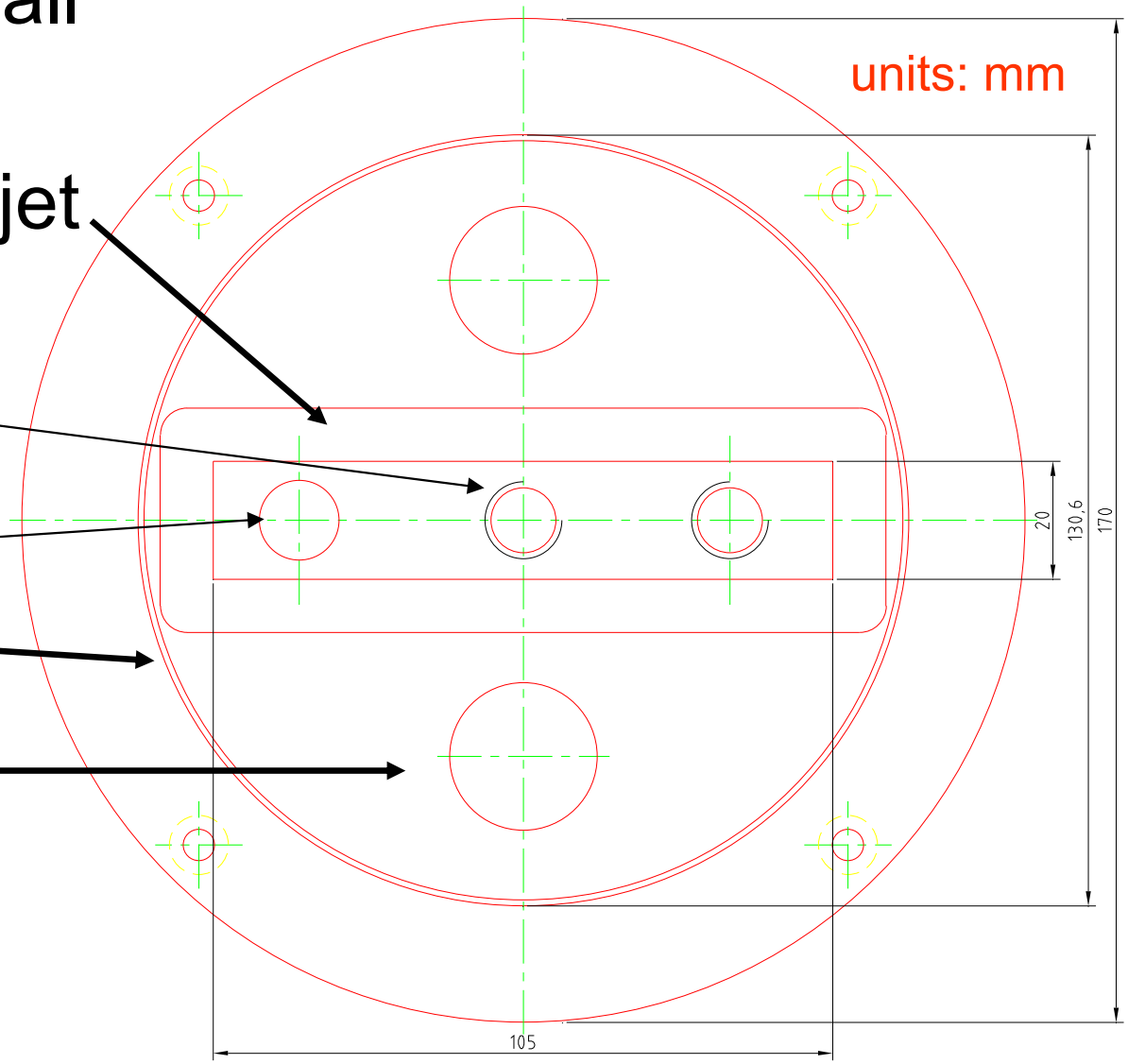
Tilted nozzle

Return pipe

✓ outer inox tube

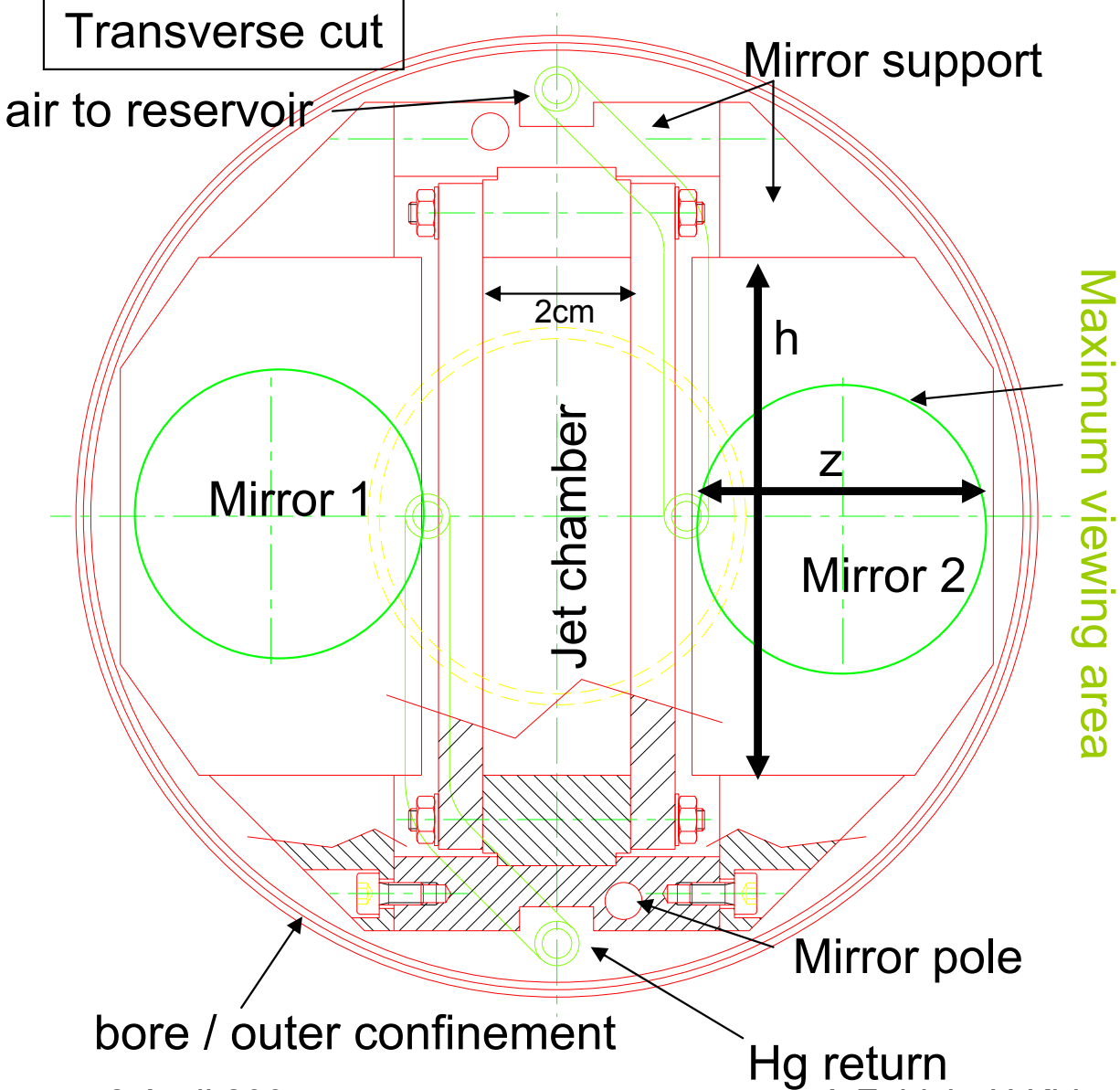
✓ Optical ligth path

+ mirror(s)



Optical System (2)

Transverse cut



Bore of magnet 13 cm contains:

- jet chamber
  - steel frame
  - Makrolon plates
- mirror system
  - support (adjustable in height) around jet chamber
  - 2 mirrors
- mercury recuperation system

The maximum observation along jet is defined by magnet bore minus the width of the jet chamber (minus some safety margins)
- Total area given by h and z

SAFETY MARGINS ~ 1mm
flexibility!

Pulse list

- Which parameters to vary and how?
  - Magnetic field (0-15, 3 T)
  - Pulse intensity (1-20, 4 TP)
  - Pulse length (0.5-20, 0.5 μs)
  - Spot size
  - Beam position (±5, 1 mm)

- Get a realistic number of pulses needed!?