Agenda

1. Brief introduction to polarized target (20 min) Jaakko Koivuniemi
2. Main features of the polarized target magnet (30 min) Naoki Takabayashi
3. Known risks in polarized target (10 min) Jaakko Koivuniemi
4. Questions from the safety officers and discussion
5. Visit to experimental area in building 888

Participants from COMPASS

Norihiro Doshita (polarized target)

Jaakko Koivuniemi (polarized target coordinator)

Gerhard Mallot (COMPASS technical coordinator)

Naoki Takabayashi (polarized target)

Invited from TIS

Alberto Desirelli (mechanical safety)

Claude Ferrari (TSO)

Claude Margaroli (pressure vessels)

Bruno Pichler (TIS)

Friedrich Szoncso (electrical safety, magnets)

Hans Taureg (DSO)

Marc Vadon (cryogenic safety)

Jaakko Koivuniemi

1. What is a spin polarized target?

2. System components

• new superconducting magnet from Oxford Instruments

• new polarized target platform

• cryogenics

2000 l LHe buffer dewar, continuous filling of magnet and cryostat

1500 l LN_2 dewar for precooling

• dilution cryostat from NA47/SMC

cooling power 1 W at 0.4 K and 20 mW at 0.1K

new microwave cavity

• pumping system from NA47/SMC

roots blowers 13500 m^3/h for ^{3}He with 27 - 350 mmol/s closed circulation

roots pumping system 2000 m^3/h for ^{4}He with 10 - 200 mmol/s closed circulation

mixture tanks in sub-atmospheric pressure

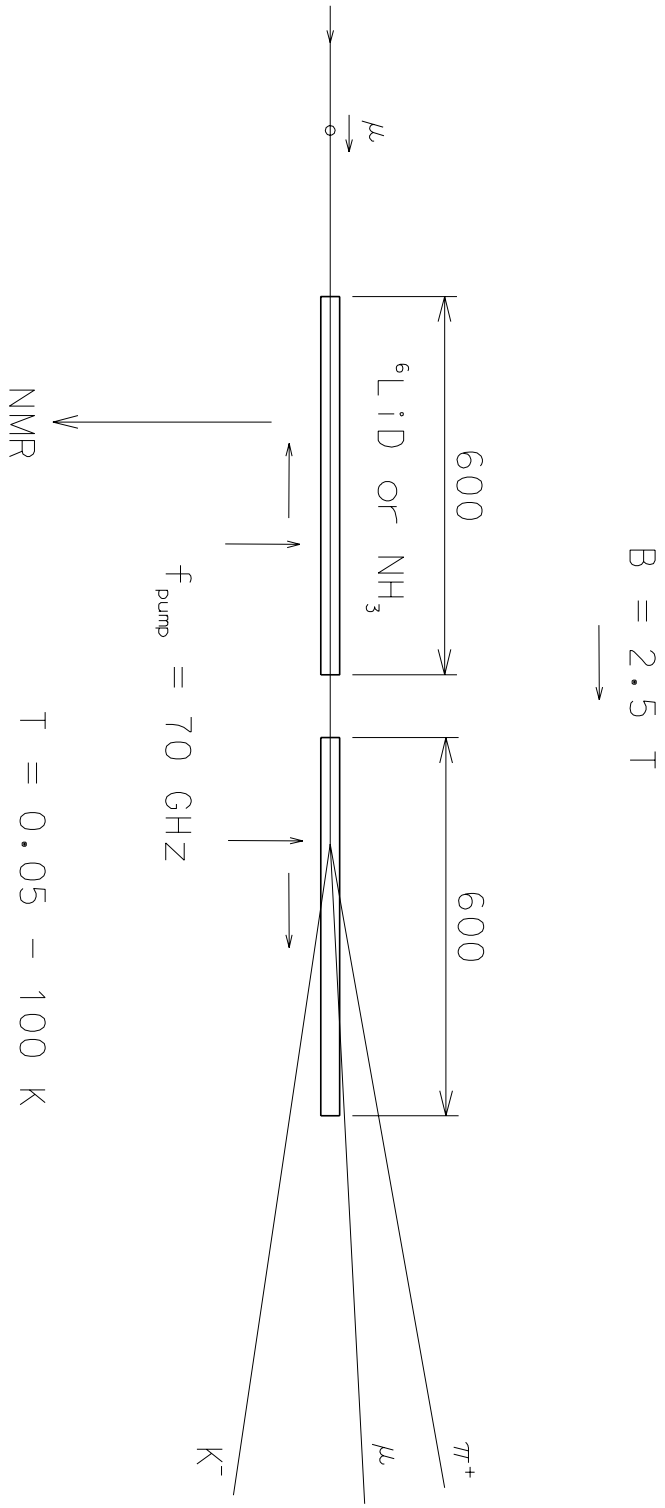
8600 liters of NTP helium gas of which ^{3}He
1070 liters NTP (CHF 250/liter)

- microwave system from NA47/SMC

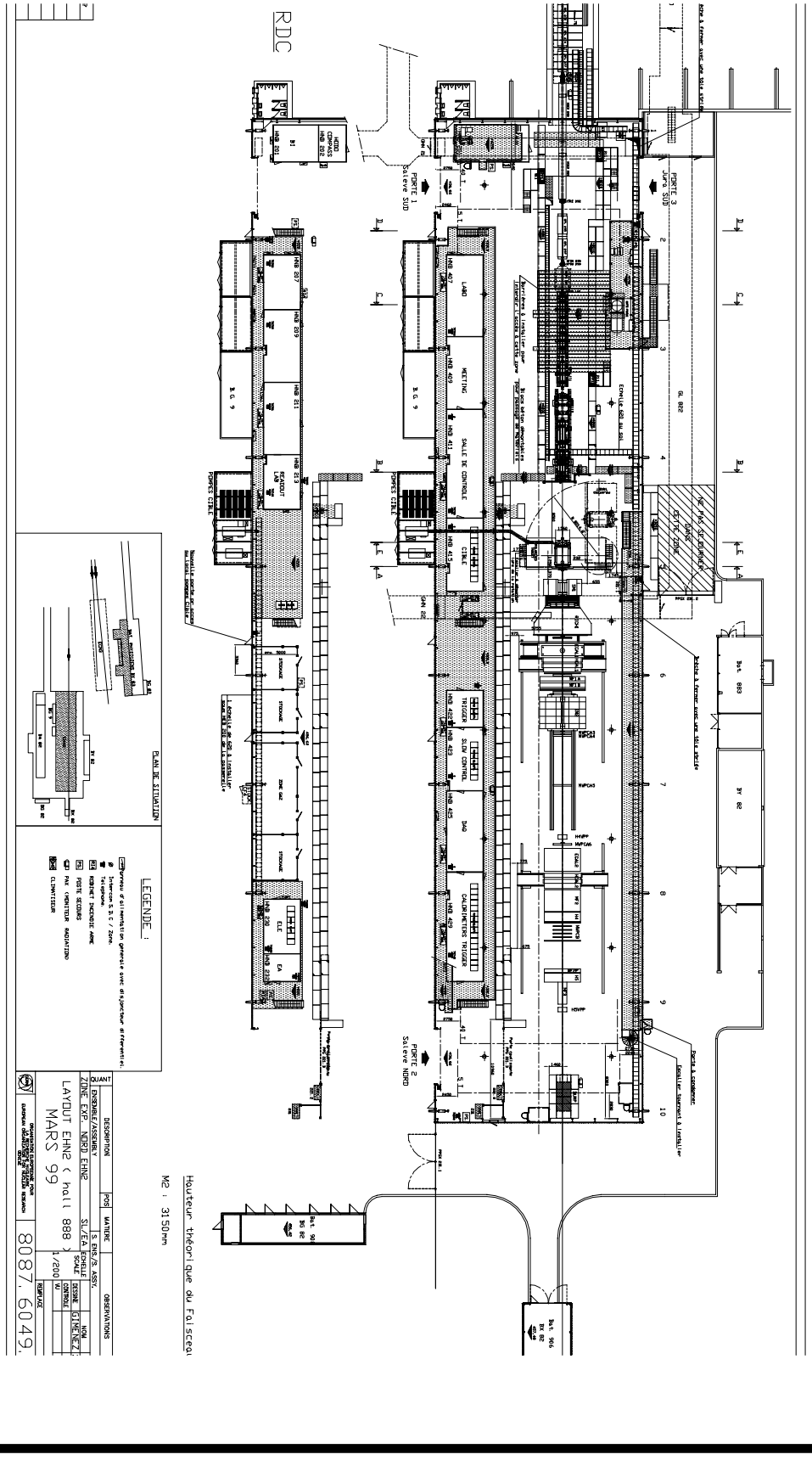
EIO tubes 10 W at 70 GHz, $<$ 1 W to target

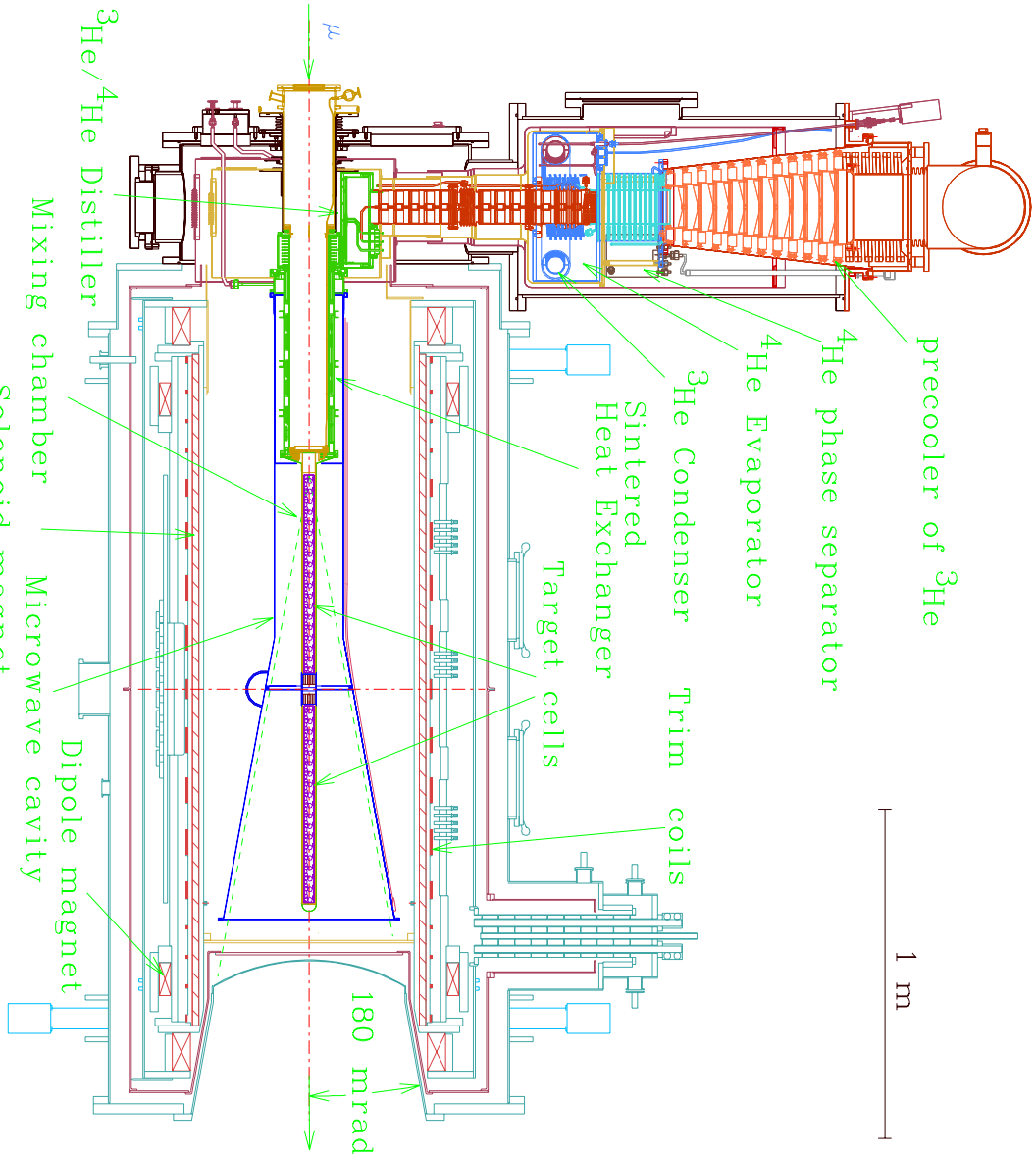
EIO tube power supplies 5 kV 72 mA

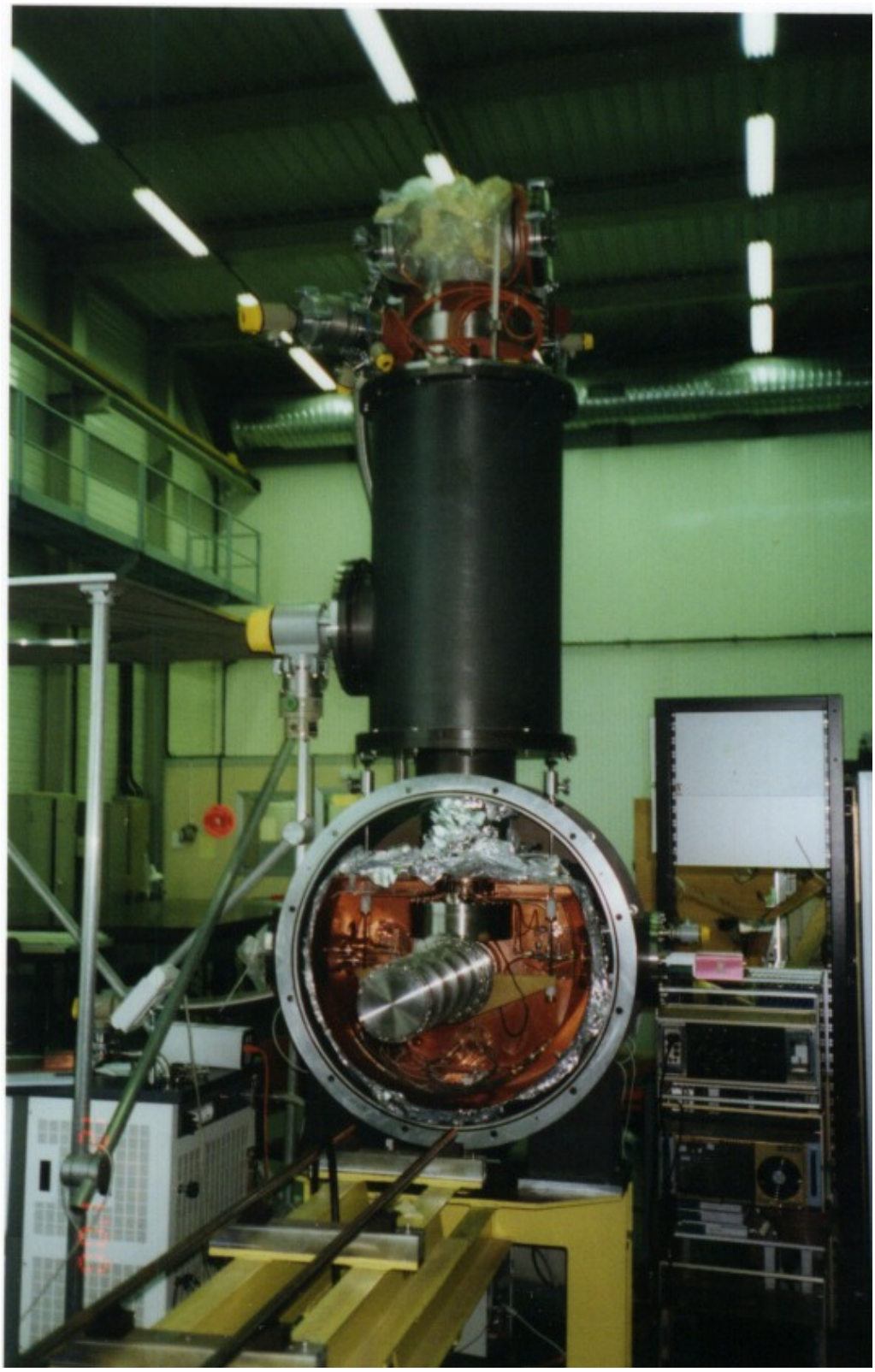
- 8 liters of target material ^{6}LiD or NH_3

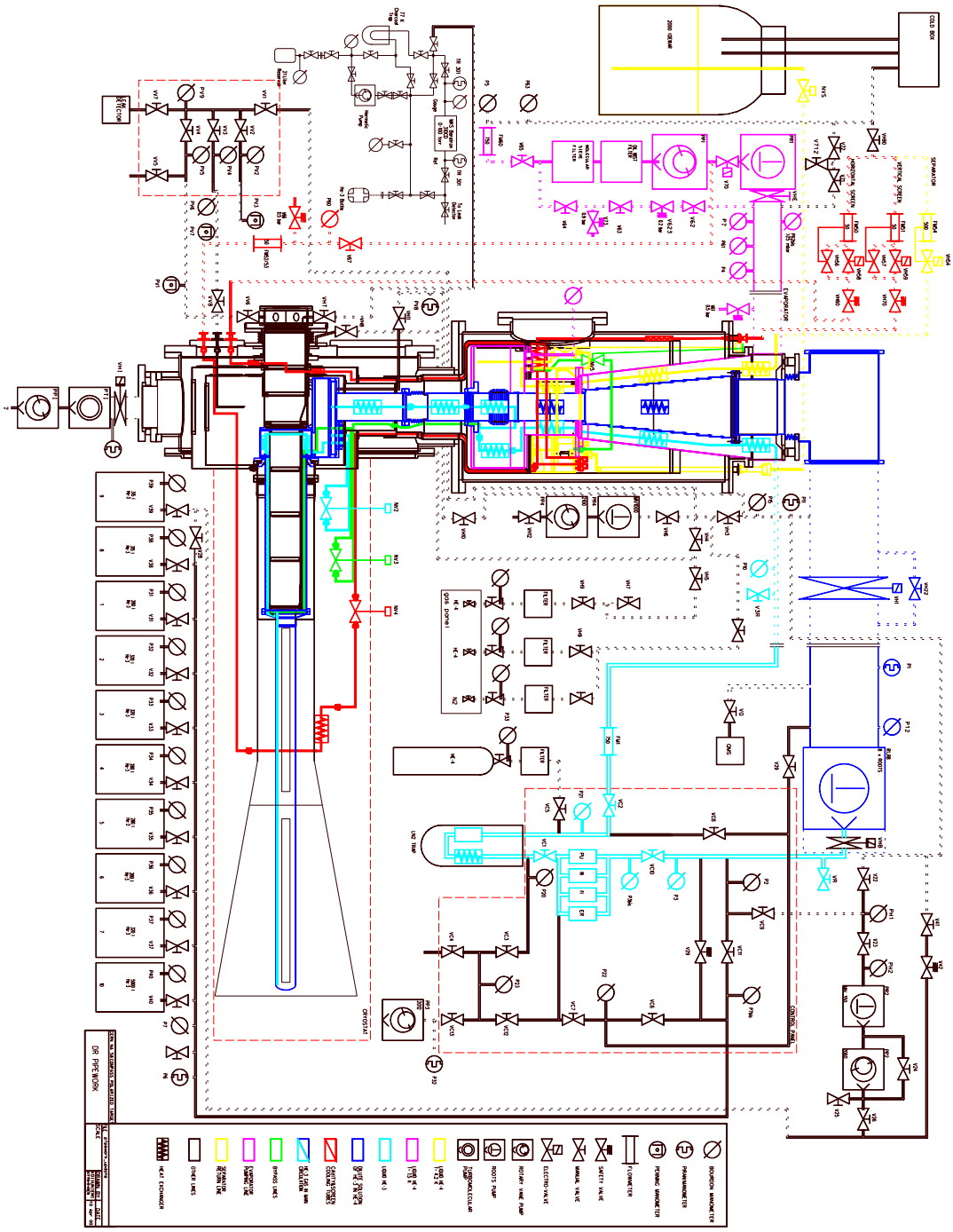

μ
6LiD or NH3
600
600
NMR
fpump = 70 GHz
T = 0.05 - 100 K
B = 2.5 T
K−
μ
π+

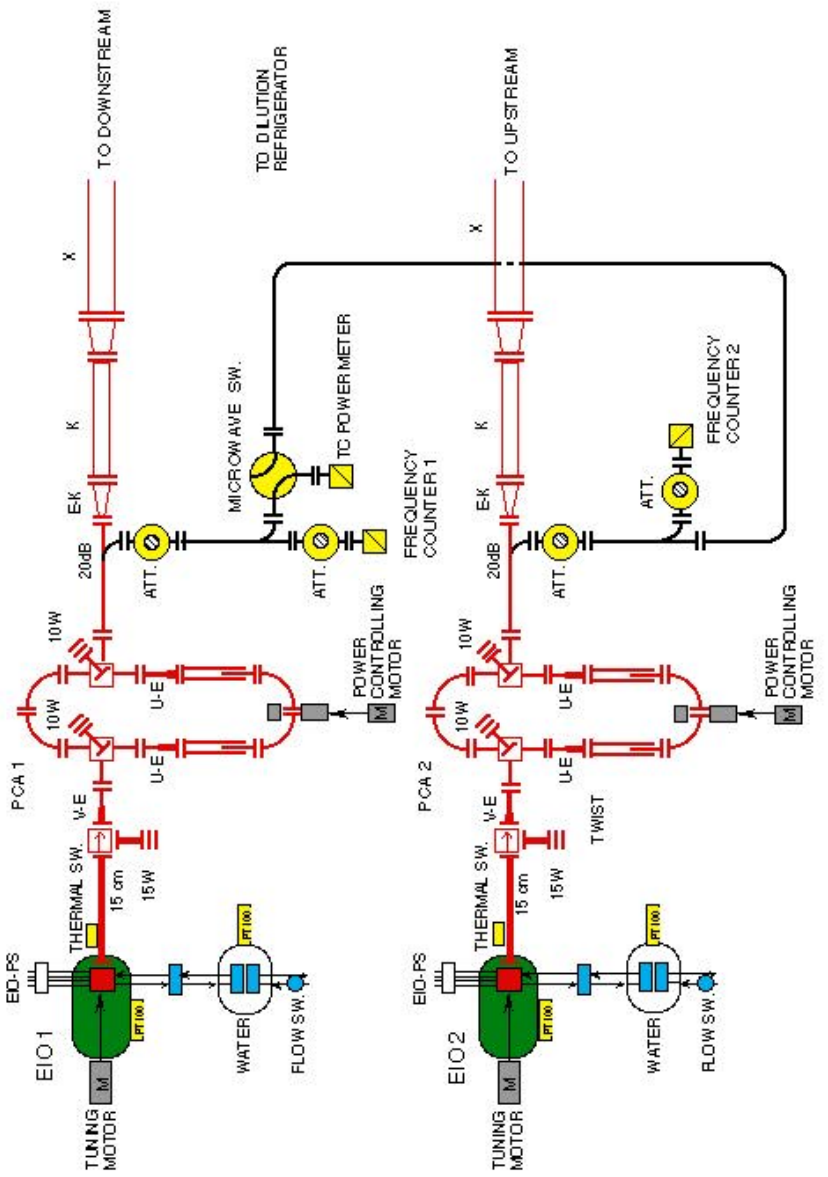
drawing for cryogenic connections from Oxford Instruments is only available as a paper copy


RDC
PORTE 1
Saleve SUD
PORTE 3
Jura SUD
PORTE 2
Saleve NORD
LAND
MEETING
SALLE DE CONTROLE
CIBLE
TRIGGER
SLOW CONTROL
DAQ
CALORIMETERS TRIGGER
READOUT
STOCKAGE
PLAN DE SITUATION
LEGENDE :
LAYOUT EHN2 (hall 888)
MARS 99
ZONE EXP. NORD EHN2
8087.6049.


μ
^{3}He/^{4}He Distiller
Mixing chamber
Solenoid magnet
Microwave cavity
Dipole magnet
Target cells
Sintered
Heat Exchanger
^{3}He Condenser
Trim coils
^{4}He Evaporator
^{4}He phase separator
precooler of ^{3}He
180 mrad
1 m







The microwave system for the SMC polarized target

01-Jun, 1994 S.Ishimoto

1. Cryogenic liquids

- normal operation LHe 2000 l + 700 l + 40 l
- in precooling LN_2 3000 l
- 700 l LHe evaporates in 1 min when magnet quenches, peak flow 12 m^3/s gas NTP

2. Magnetic field and quench protection

- 2.5 T nominal operation field
- in quench 800 V_{peak} with 700 A_{peak} to external dump resistor, decay to zero in 10 s

3. PT-magnet and SM1 interaction

- mechanical stress
- stability of superconducting magnet

4. PT-magnet and dilution share same isolation vacuum

- leak in cryostat $\Rightarrow$ sudden warm up of magnet and cryostat
- possibility to lose expensive ^{3}He