New Developments and a Review of the Accelerator Facilities at iThemba LABS

RuPAC-2012 Conference

Saint-Petersburg, RUSSIA September 24-28

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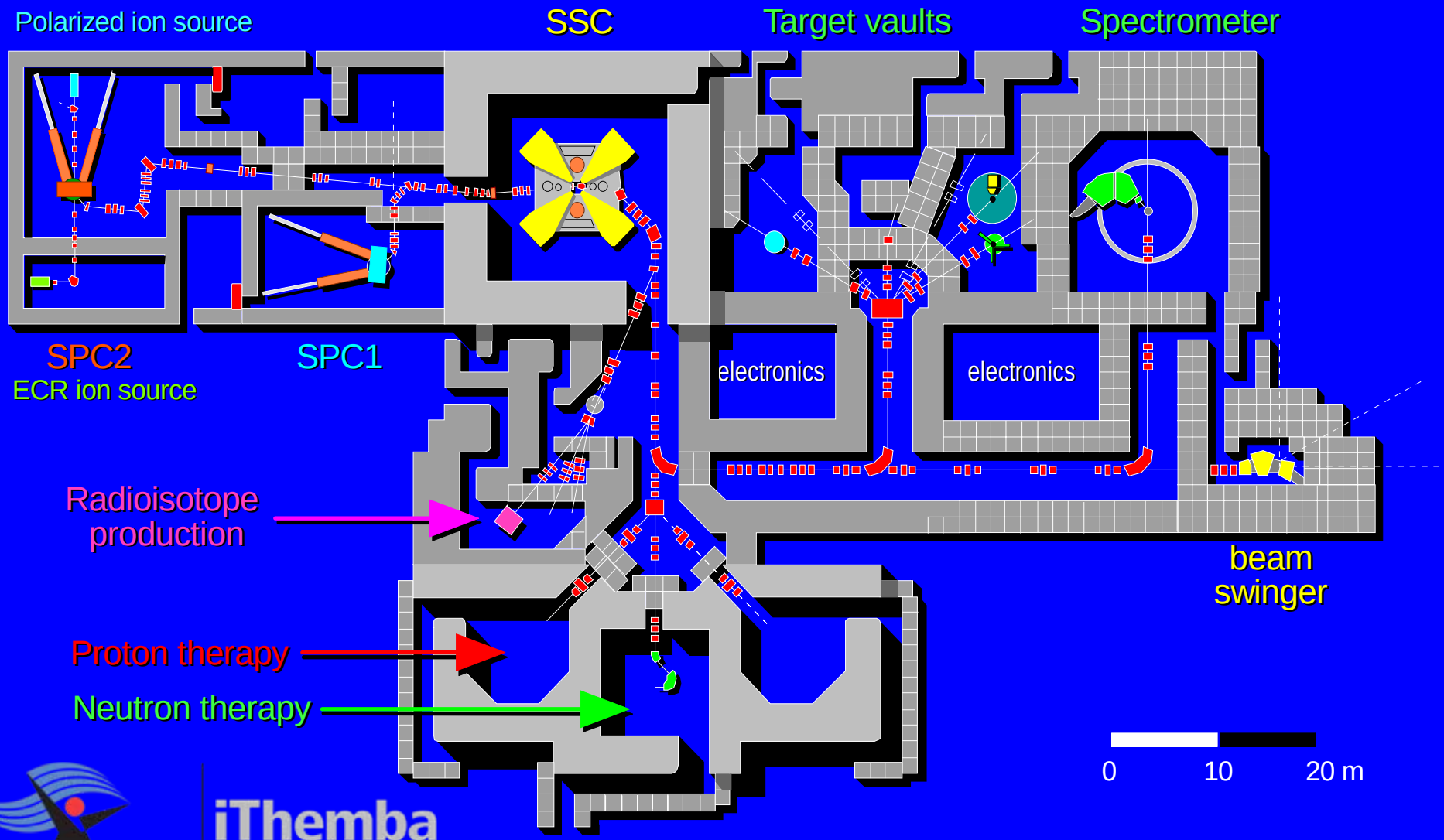
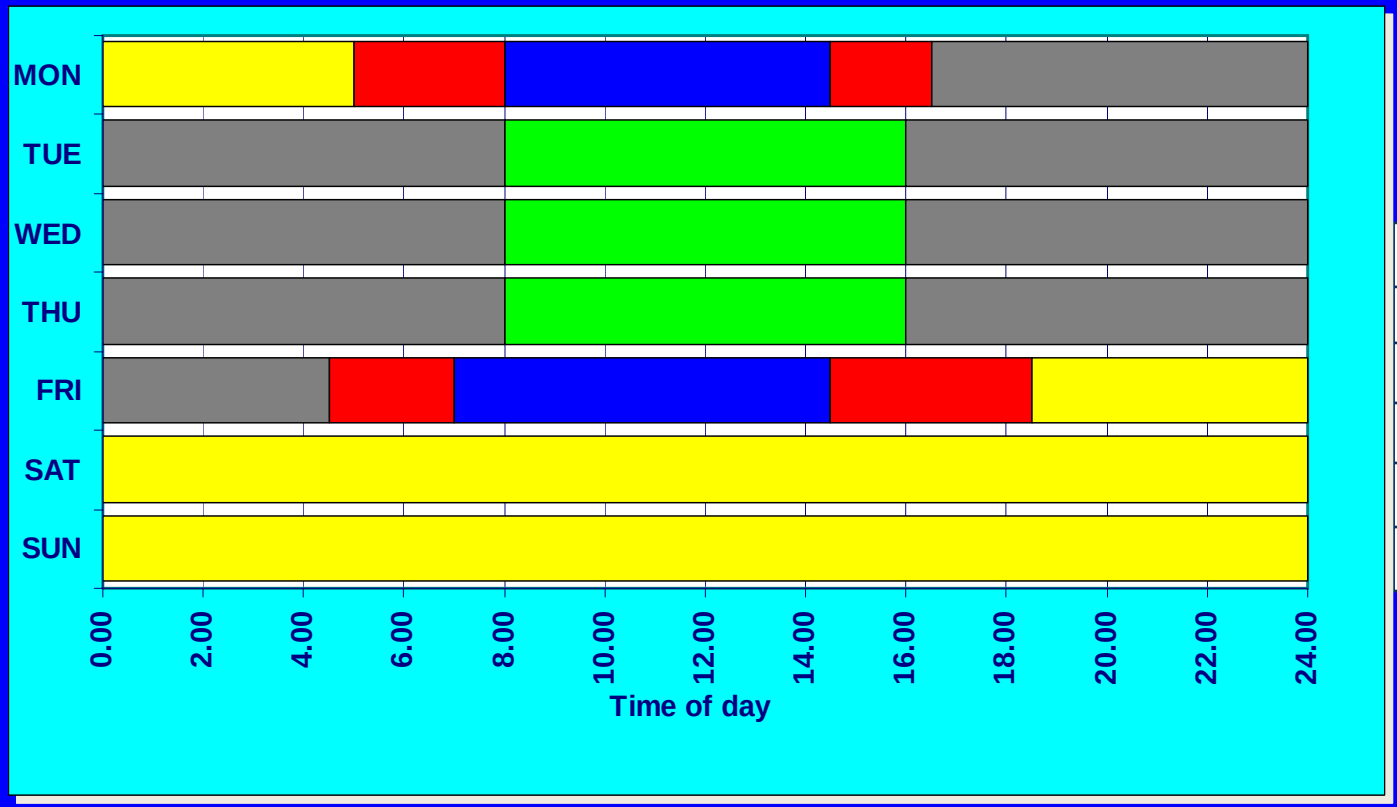
Separated-Sector Cyclotron Facility



Beam Schedule

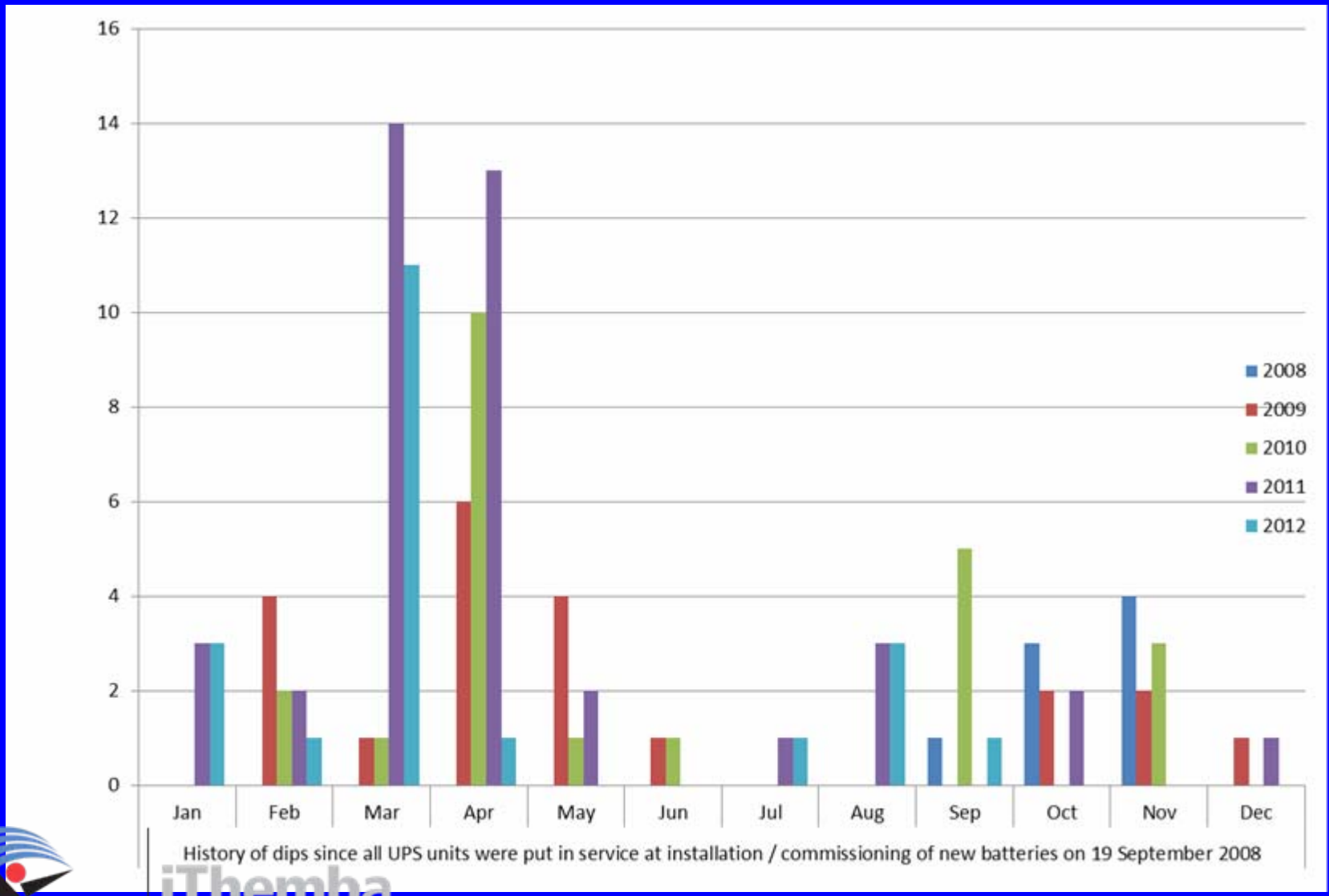


Operating Statistics for the past 8 years

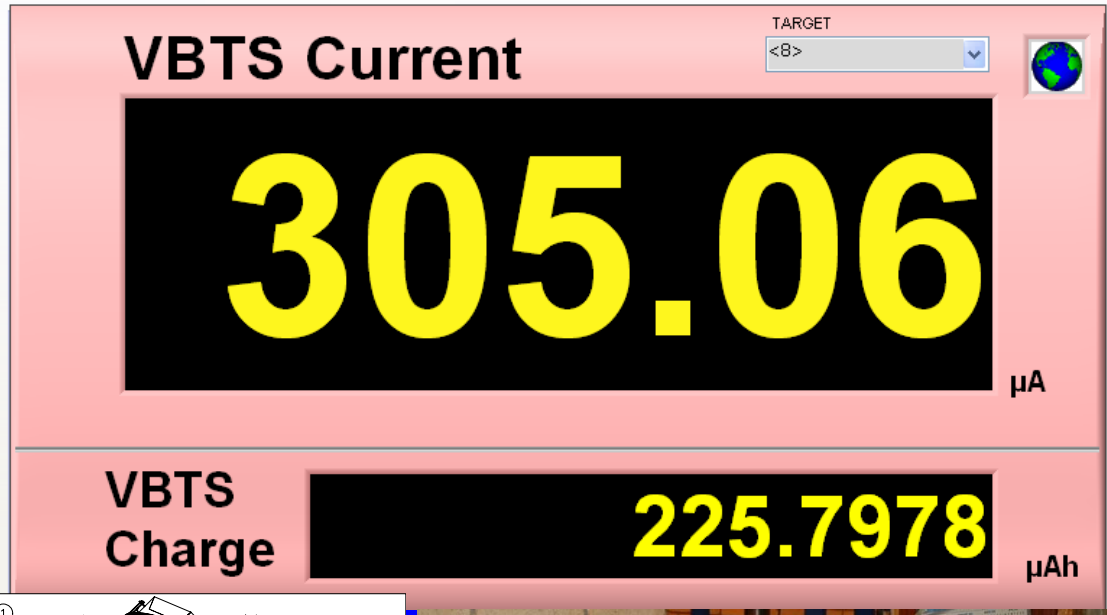
Year	Beam Supplied as:		% of Scheduled beam time for:	
	% of Total time	% of Scheduled* time	Energy Changes	Interruptions
2004	72.0	84.9	6.7	5.9
2005	71.3	83.6	5.5	6.4
2006	66.1	80.3	5.5	7.9
2007	67.1	79.28	5.4	10.4
2008	62.0	75.17	4.0	14.3
2009	70.5	83.7	6.9	7.9
2010	67.6	82.18	5.2	7.3
2011	68.9	85.91	5.4	4.8

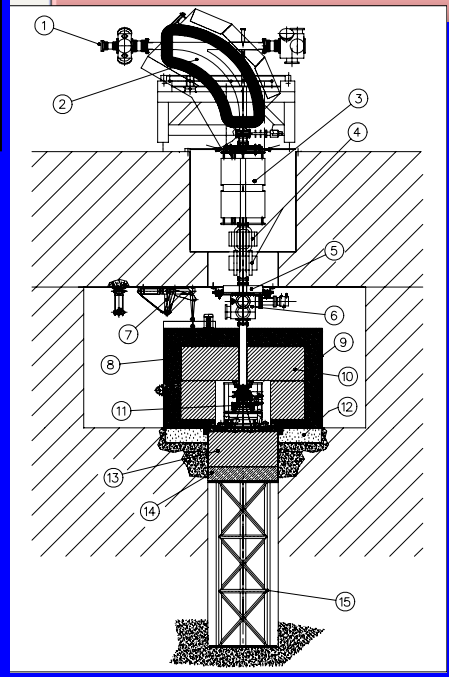
4 MW Uninterruptible Power Supply (UPS)

Power Dips handled by the UPS




20J
Q19J


TARGET
<8>
VBTS Current
305.06
μA
VBTS Charge
225.7978
μAh


1
2
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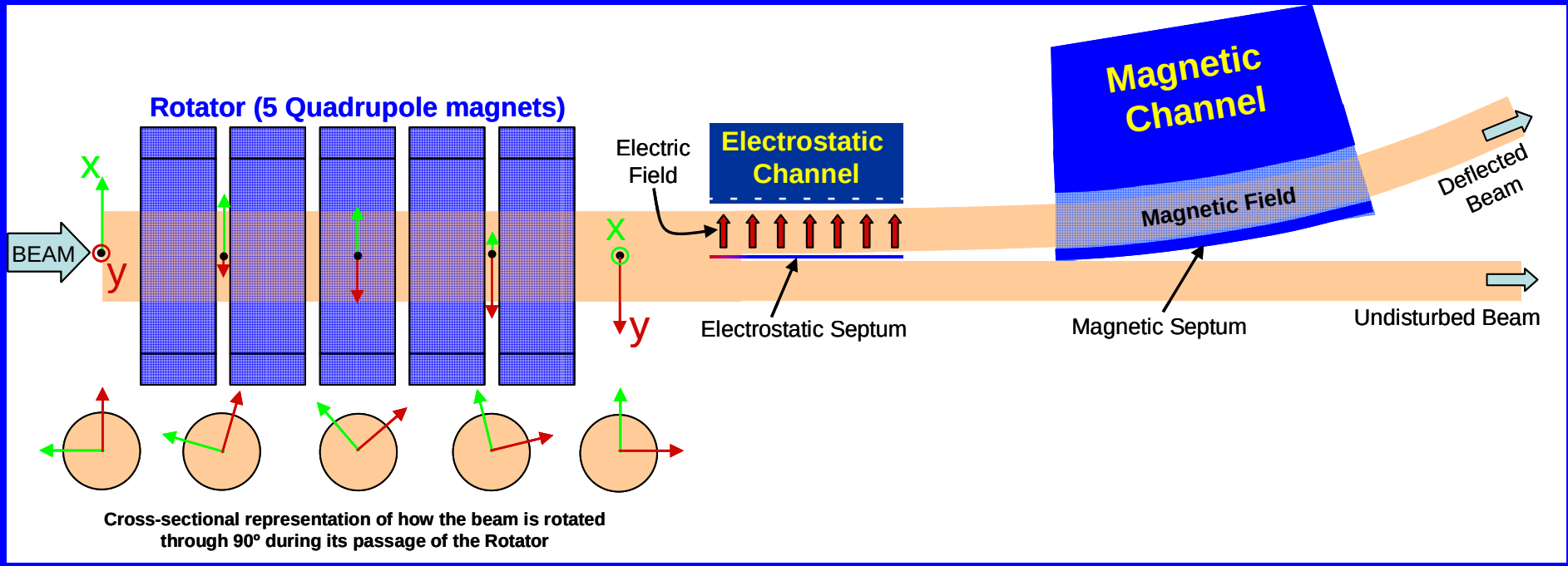
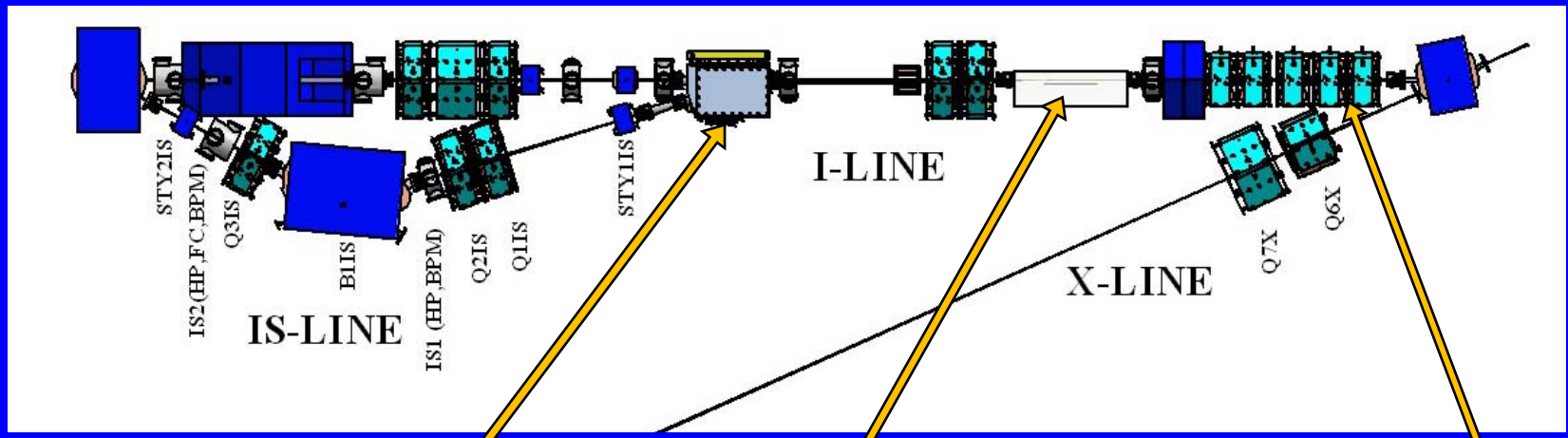
15

Beam Splitter

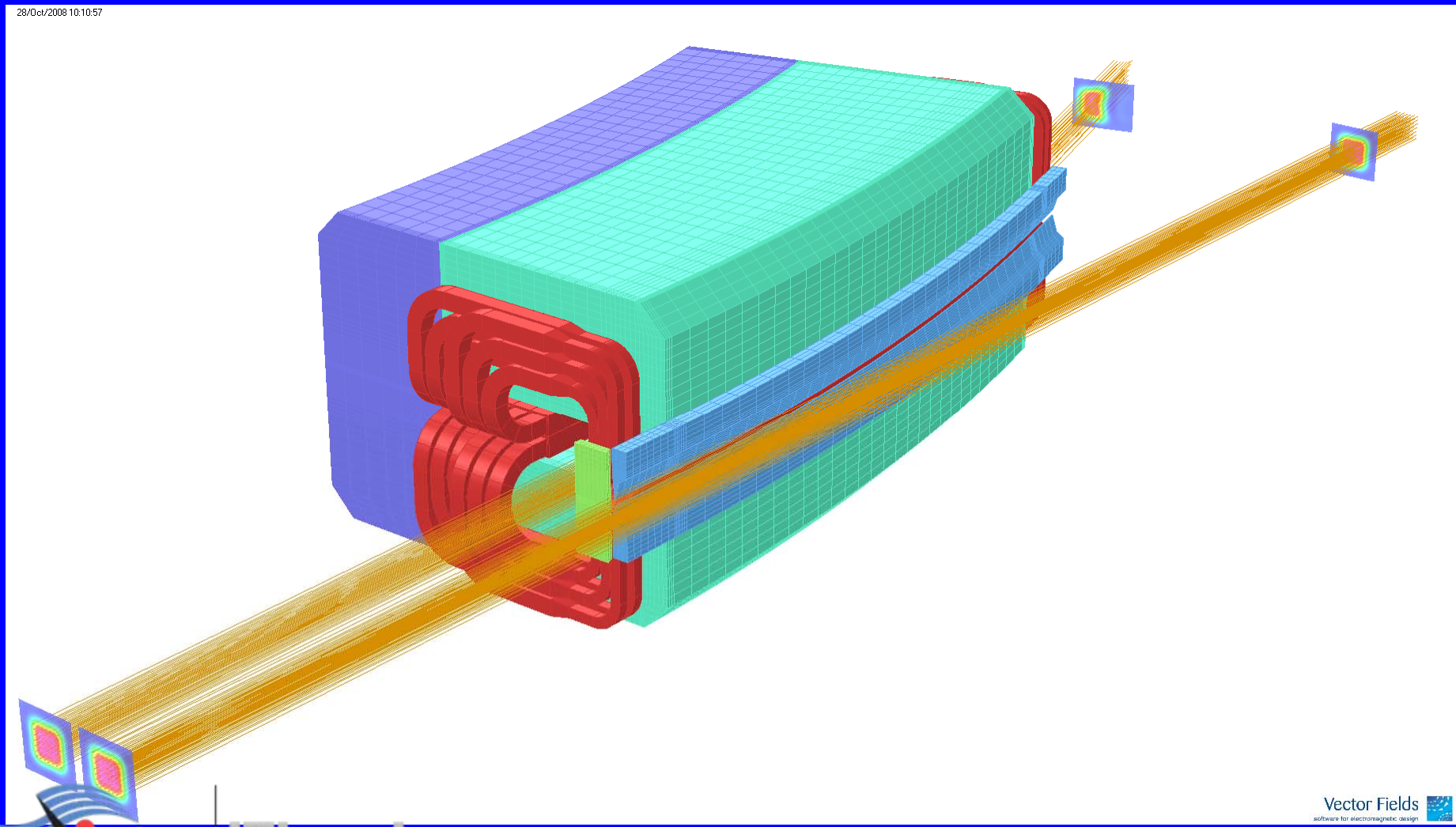


Beam Splitter

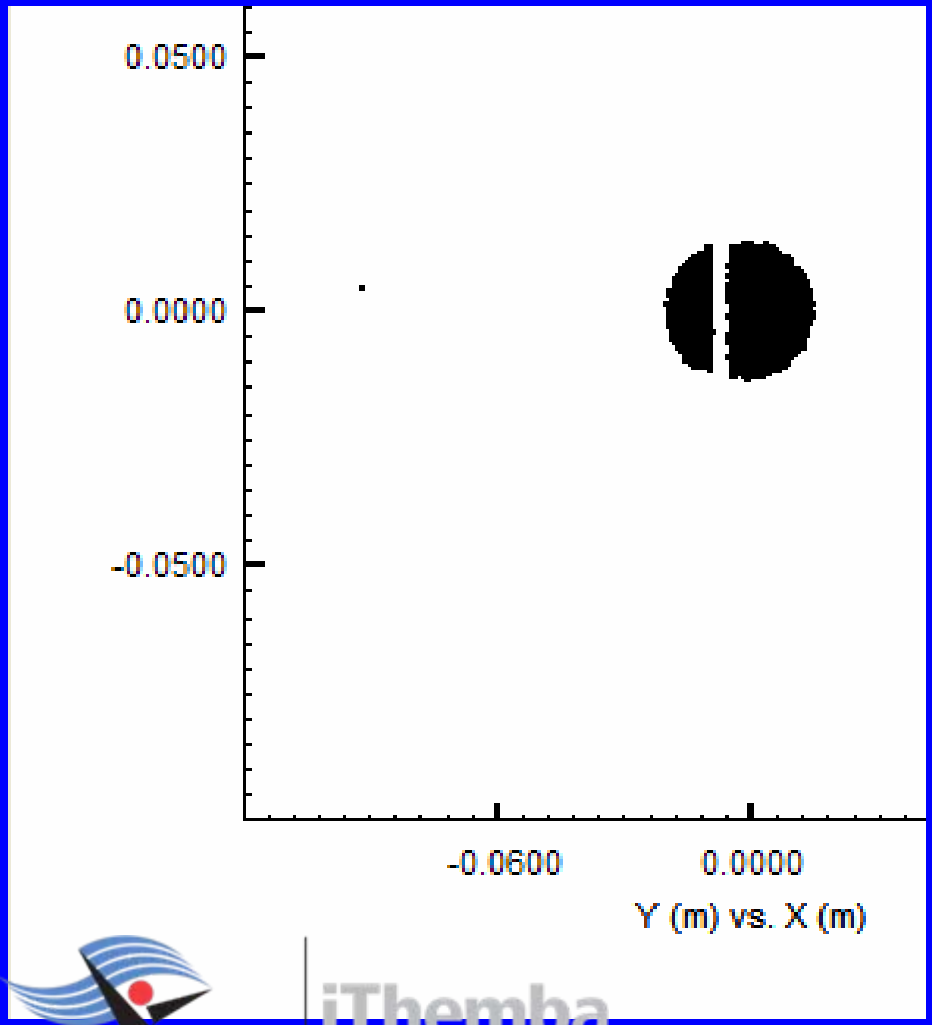


Electrostatic Channel
a mirror image of the PSI design

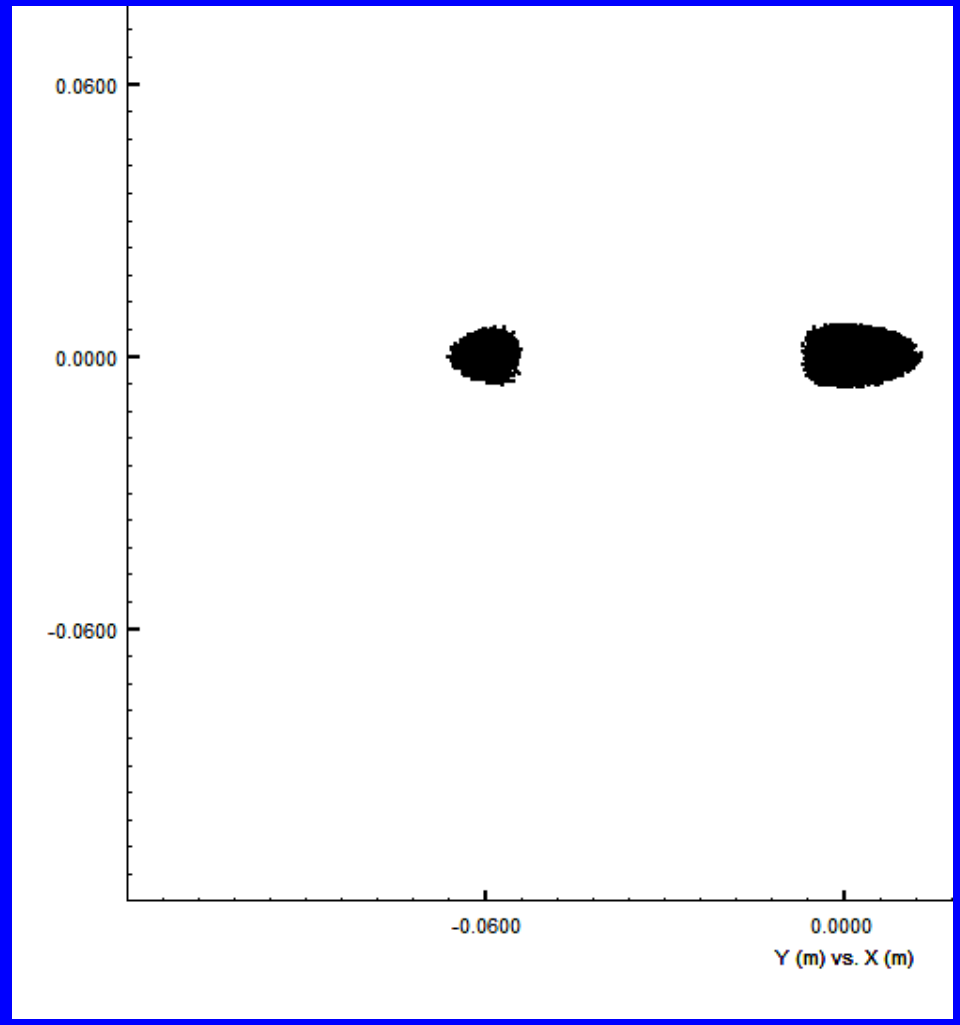
Magnetic Channel



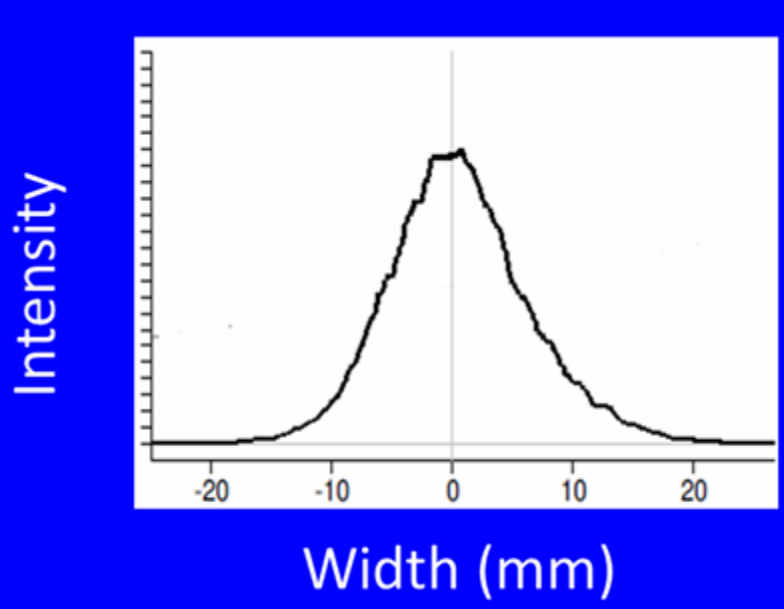
Beam behind the electrostatic channel

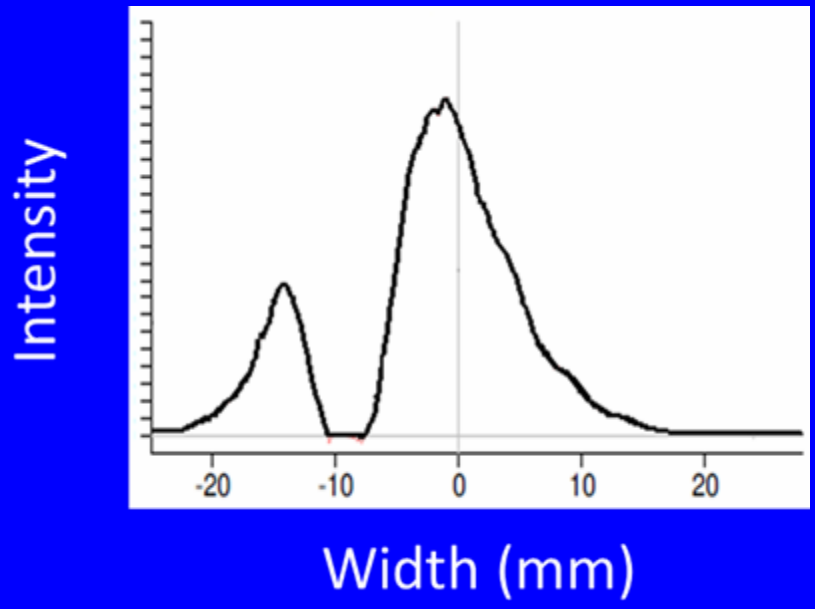


Beam in front of the magnetic channel

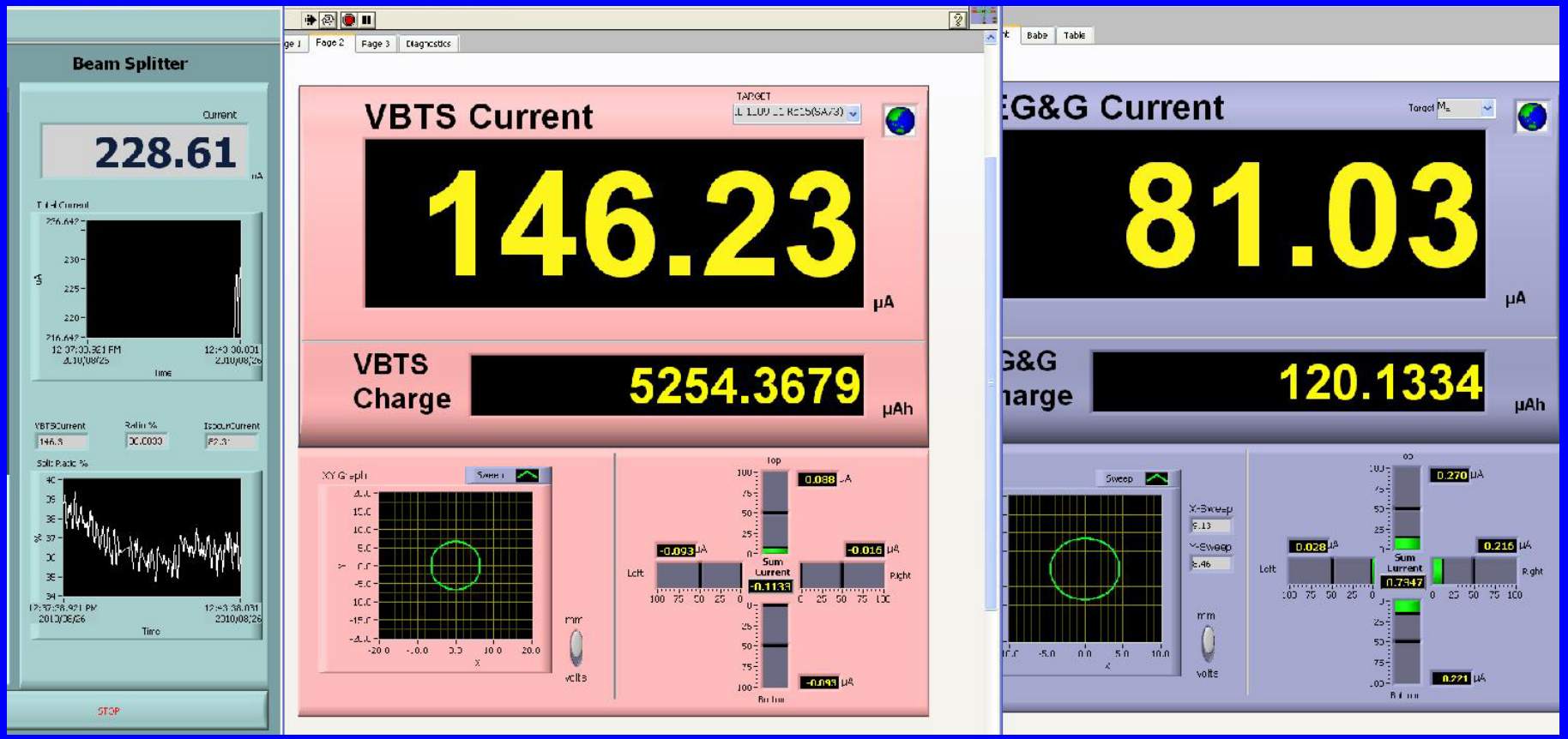


Beam Profile
showing clear separation between the deflected part and the main beam

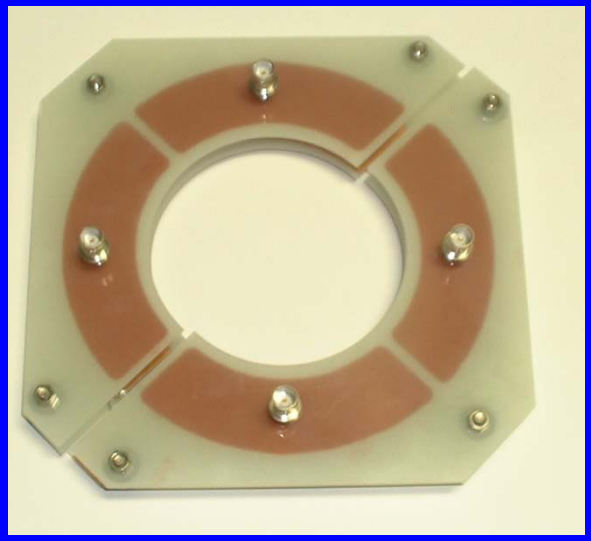


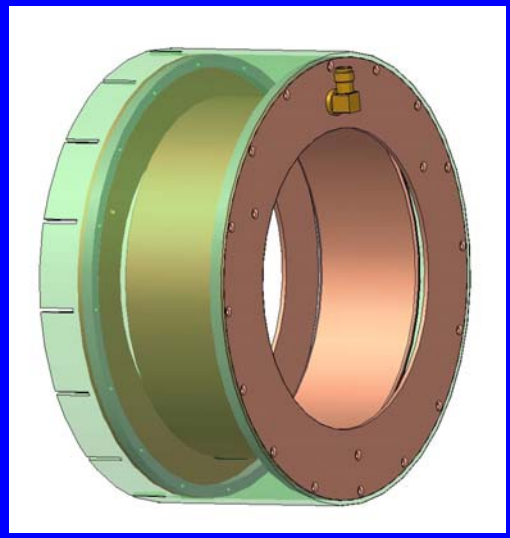


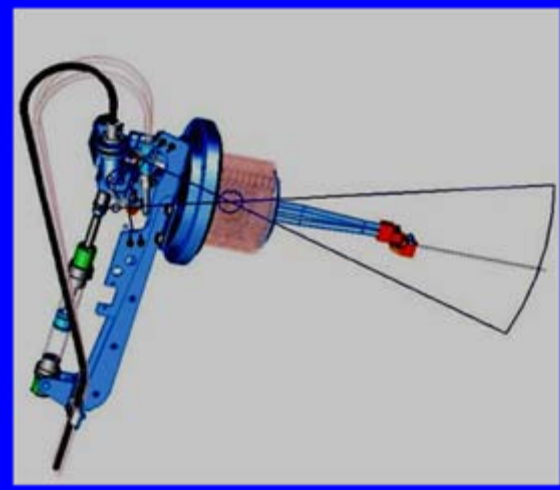
Measured Beam Current



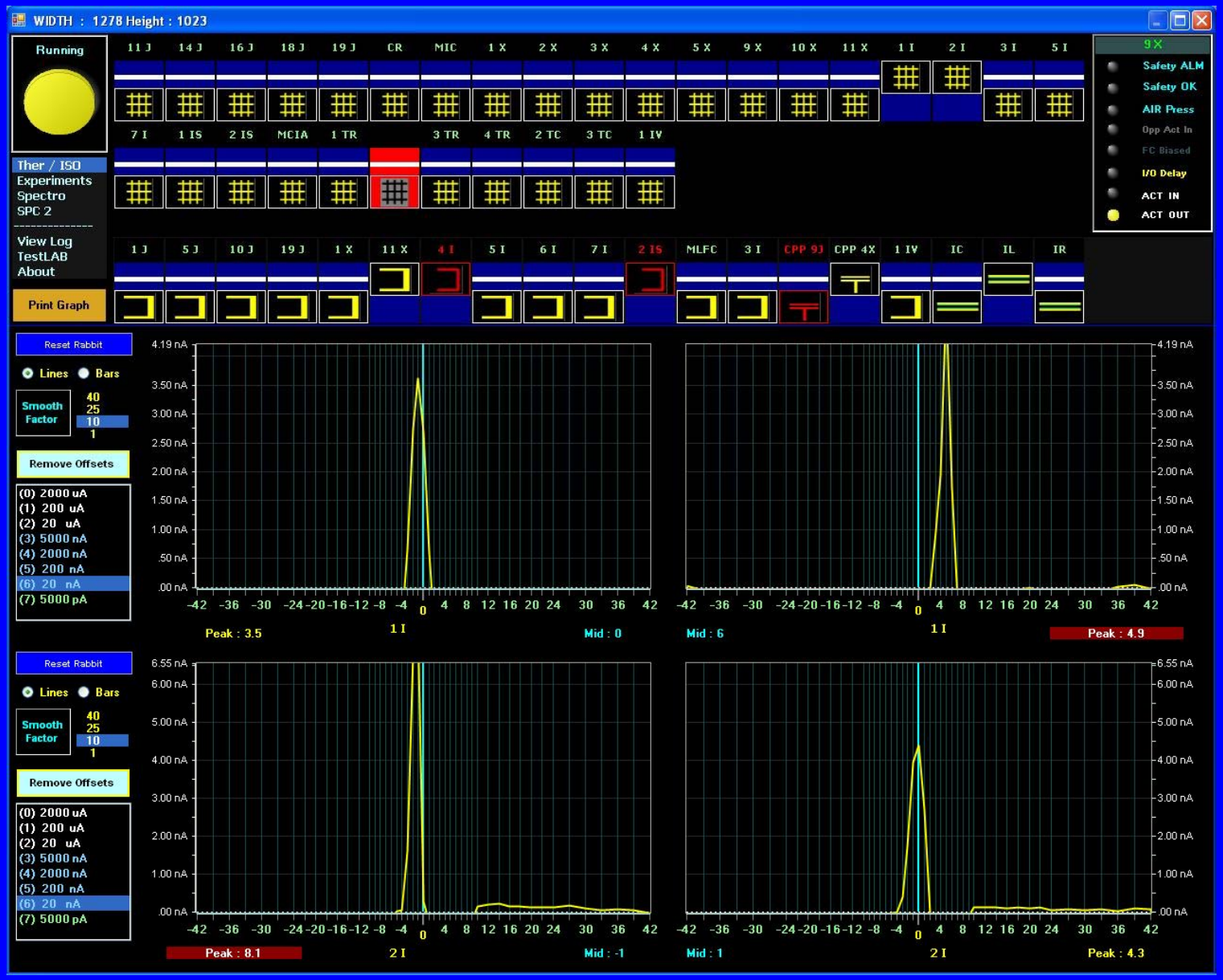
Beam diagnostics developed for high beam intensities





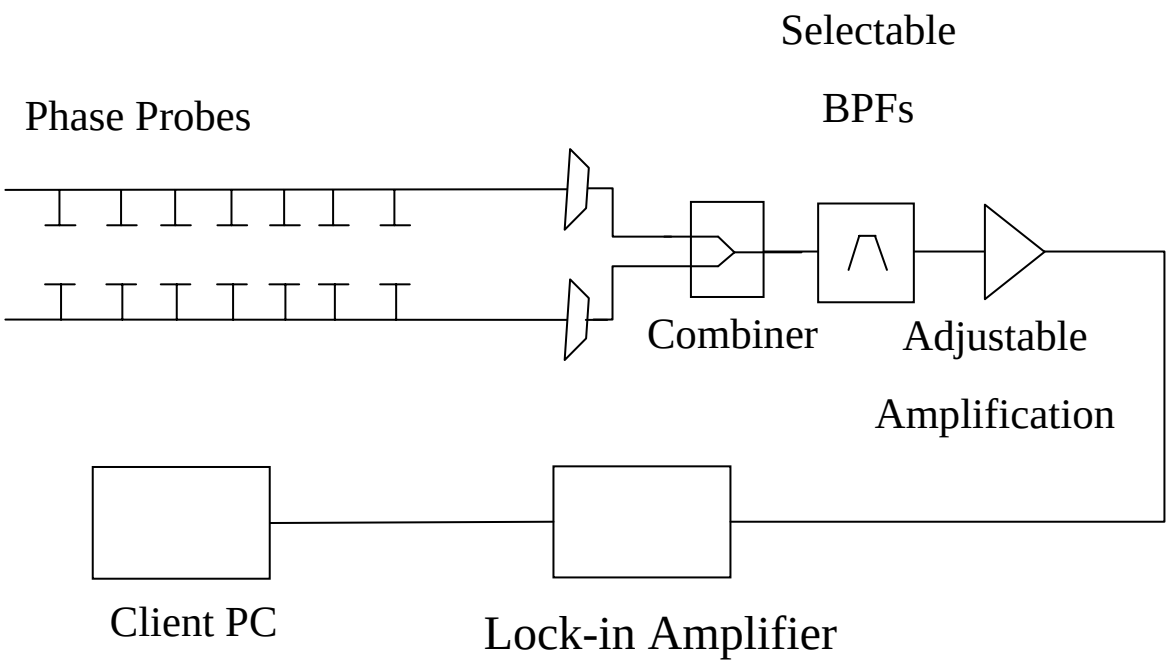


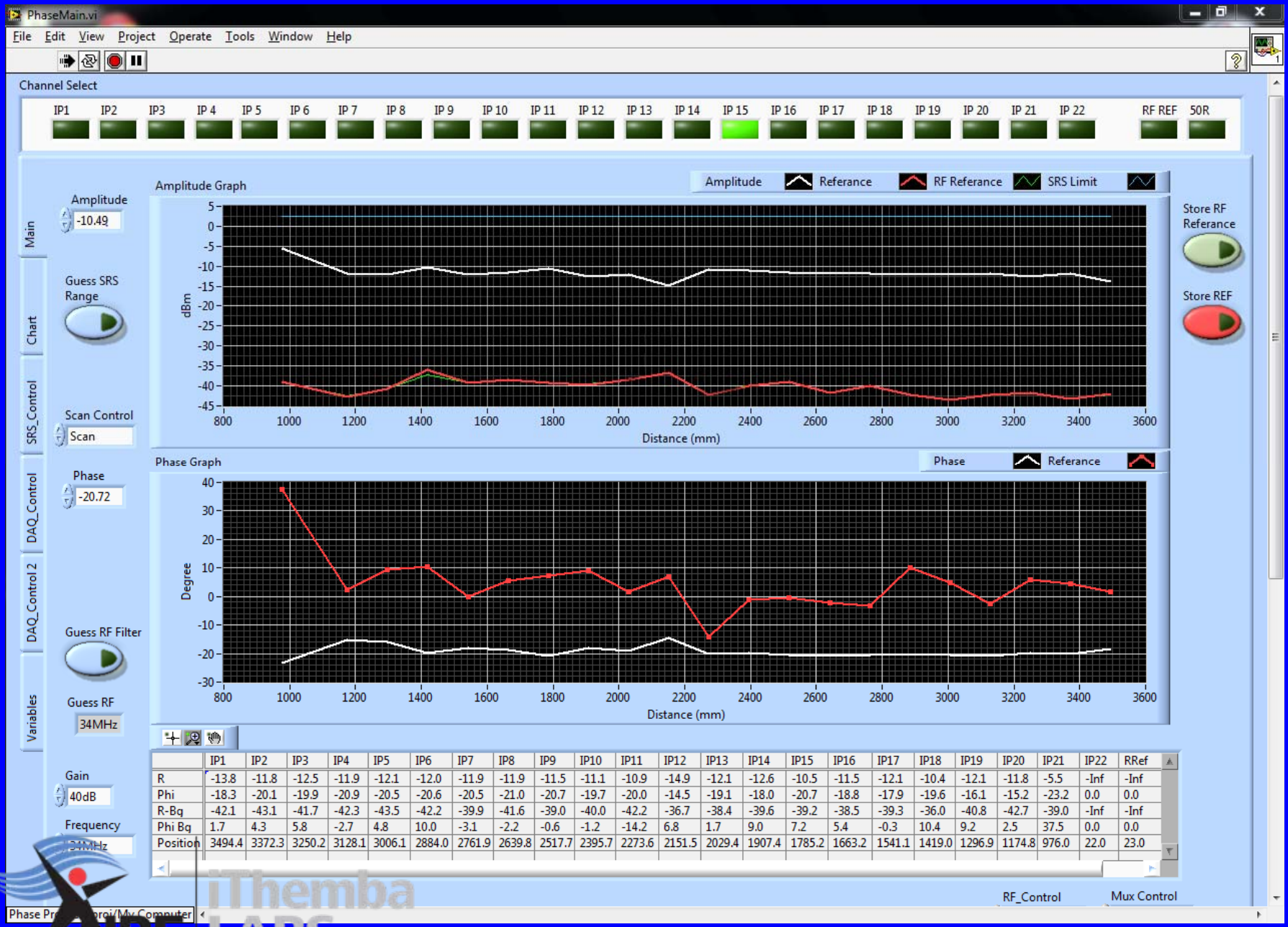
New Grid Electronics



Phase Probe Structure in the Vacuum Chamber of the Separated Sector Cyclotron

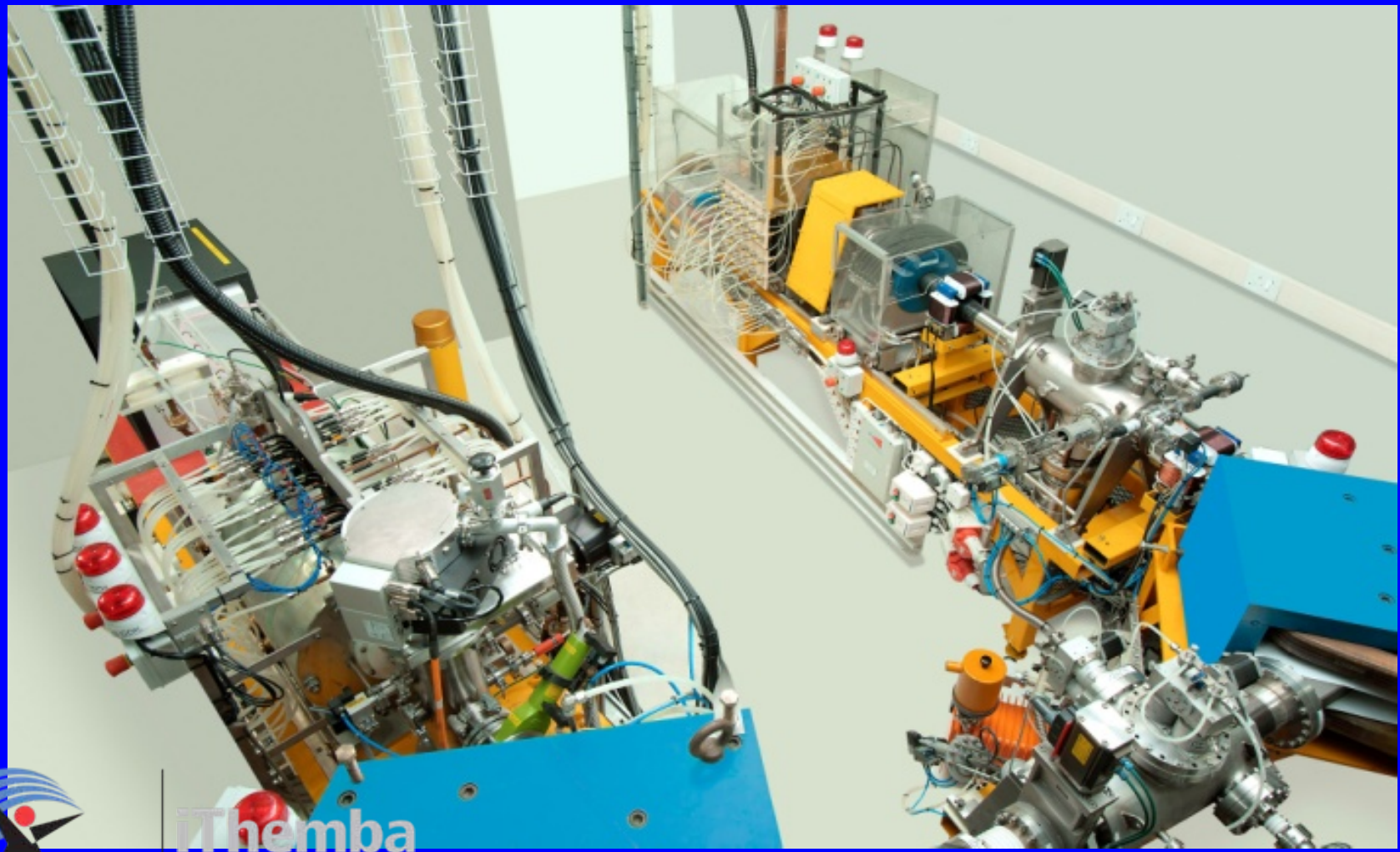
SSC Non-destructive Beam Phase Probe Measurement System



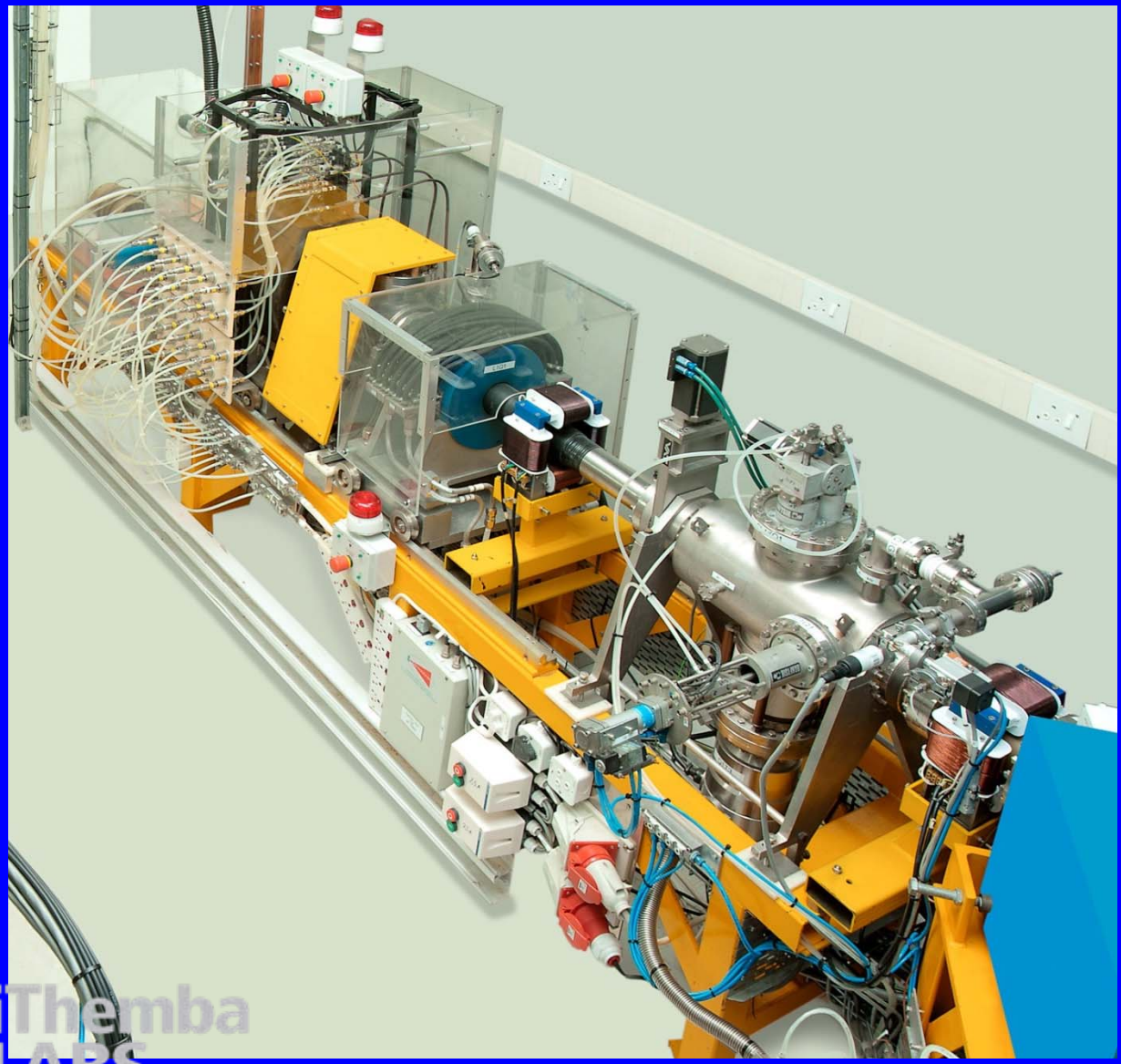


	IP1	IP2	IP3	IP4	IP5	IP6	IP7	IP8	IP9	IP10	IP11	IP12	IP13	IP14	IP15	IP16	IP17	IP18	IP19	IP20	IP21	IP22	RRef
R	-13.8	-11.8	-12.5	-11.9	-12.1	-12.0	-11.9	-11.9	-11.5	-11.1	-10.9	-14.9	-12.1	-12.6	-10.5	-11.5	-12.1	-10.4	-12.1	-11.8	-5.5	-Inf	-Inf
Phi	-18.3	-20.1	-19.9	-20.9	-20.5	-20.6	-20.5	-21.0	-20.7	-19.7	-20.0	-14.5	-19.1	-18.0	-20.7	-18.8	-17.9	-19.6	-16.1	-15.2	-23.2	0.0	0.0
R-Bq	-42.1	-43.1	-41.7	-42.3	-43.5	-42.2	-39.9	-41.6	-39.0	-40.0	-42.2	-36.7	-38.4	-39.6	-39.2	-38.5	-39.3	-36.0	-40.8	-42.7	-39.0	-Inf	-Inf
Phi Bq	1.7	4.3	5.8	-2.7	4.8	10.0	-3.1	-2.2	-0.6	-1.2	-14.2	6.8	1.7	9.0	7.2	5.4	-0.3	10.4	9.2	2.5	37.5	0.0	0.0
Position	3494.4	3372.3	3250.2	3128.1	3006.1	2884.0	2761.9	2639.8	2517.7	2395.7	2273.6	2151.5	2029.4	1907.4	1785.2	1663.2	1541.1	1419.0	1296.9	1174.8	976.0	22.0	23.0

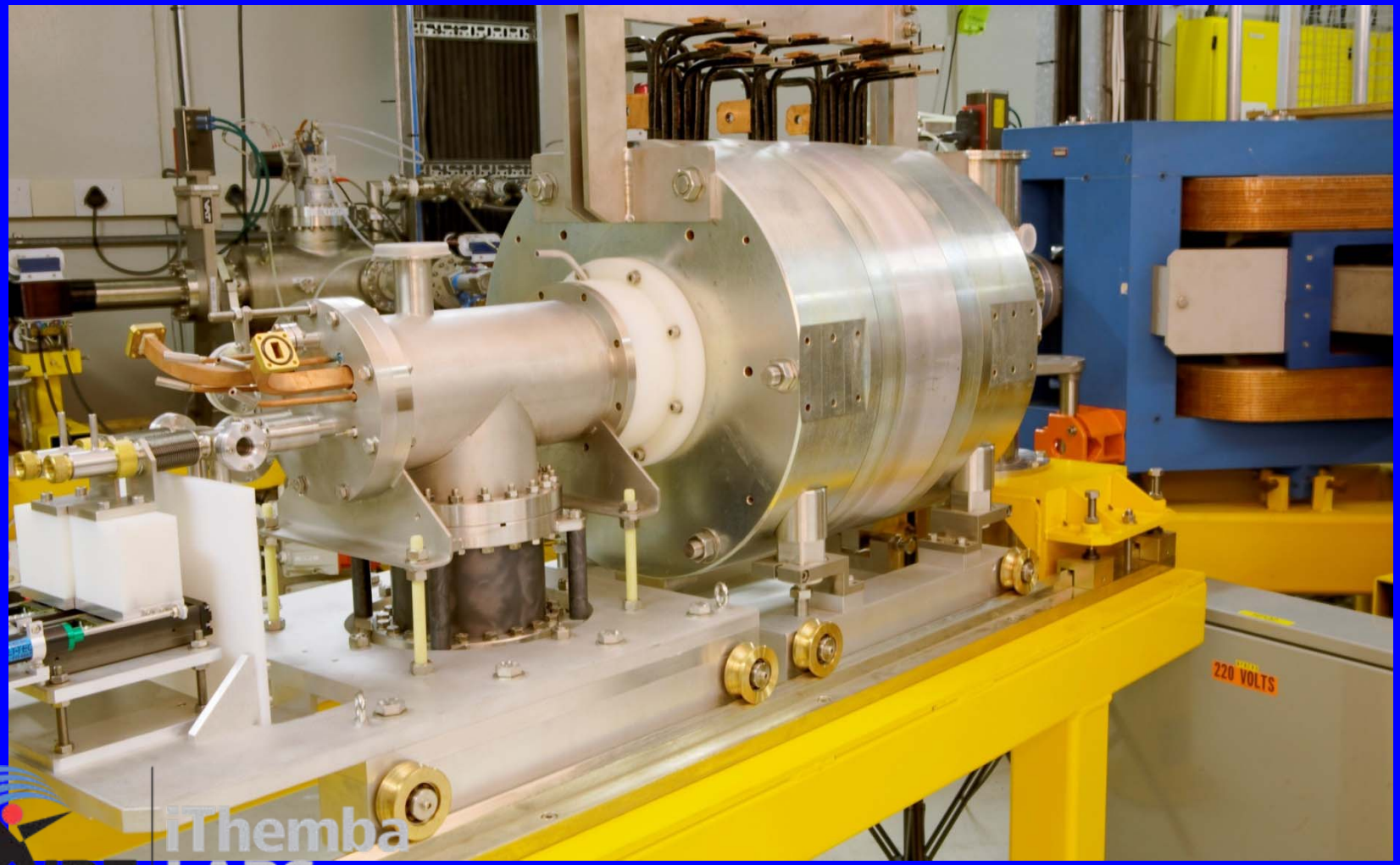
GTS2 and HMI ECRIS Ion Sources



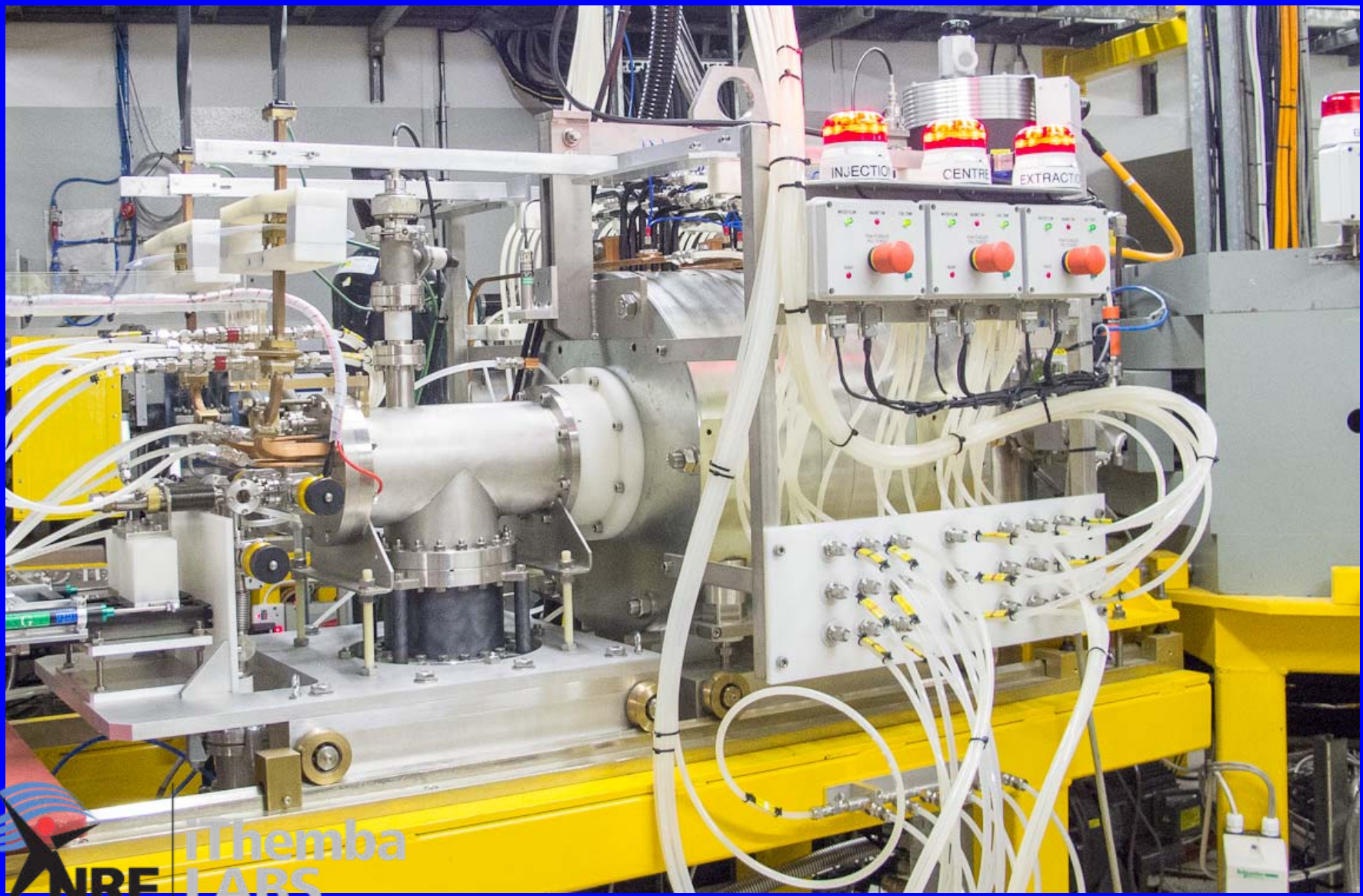
HMI ECRIS in operation since 2009



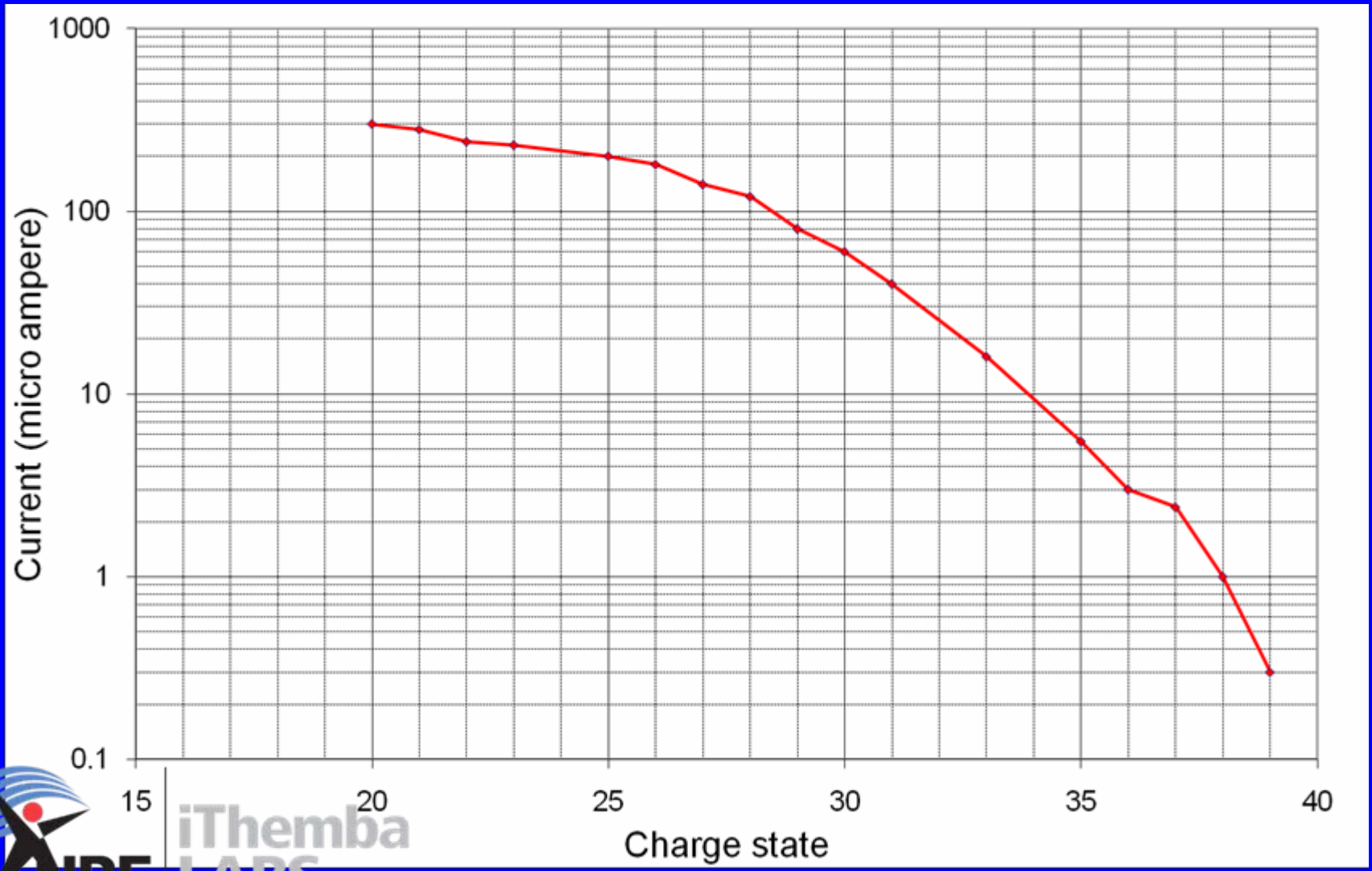
GTS2 ECRIS partially assembled



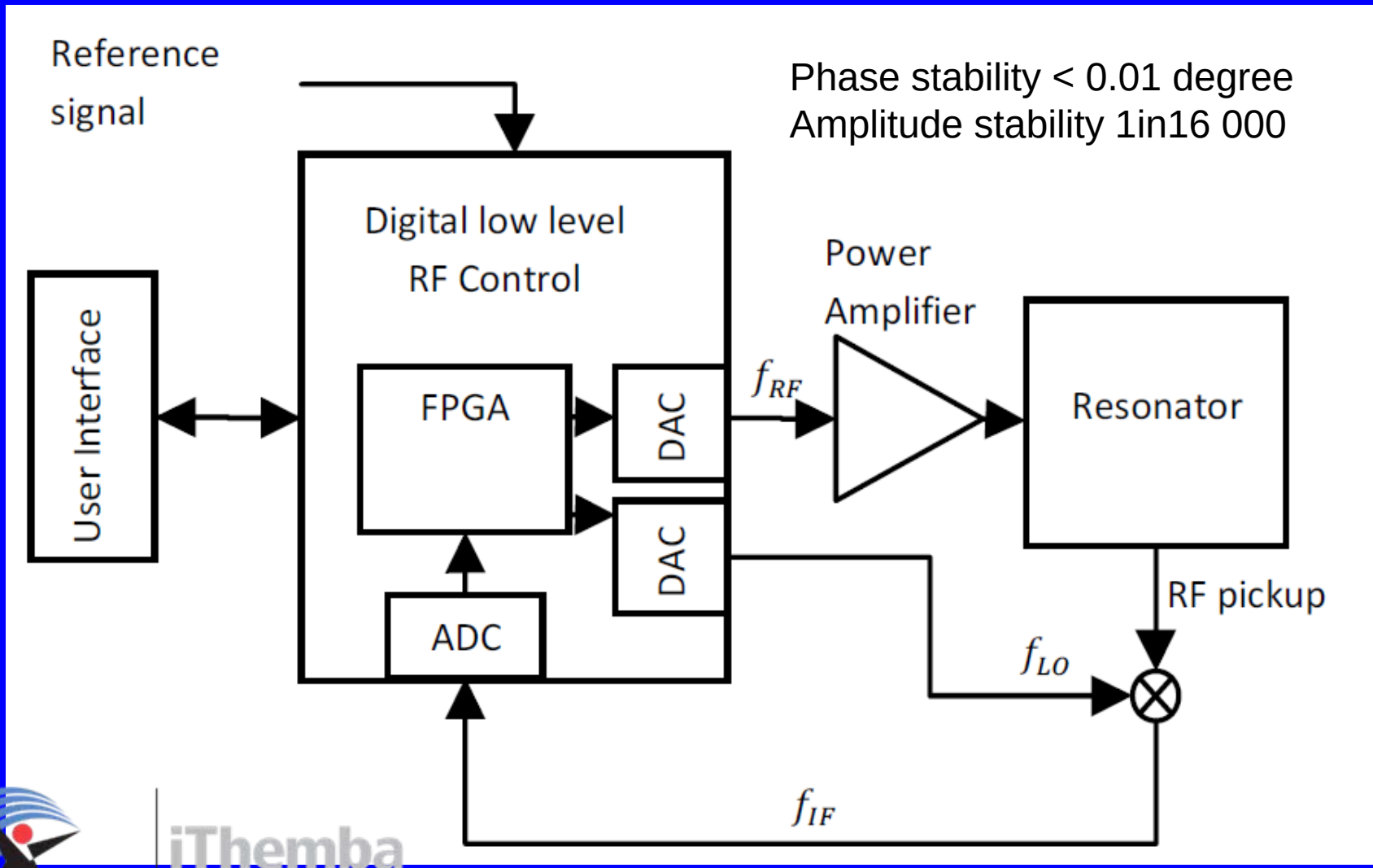
GTS2 ECRIS



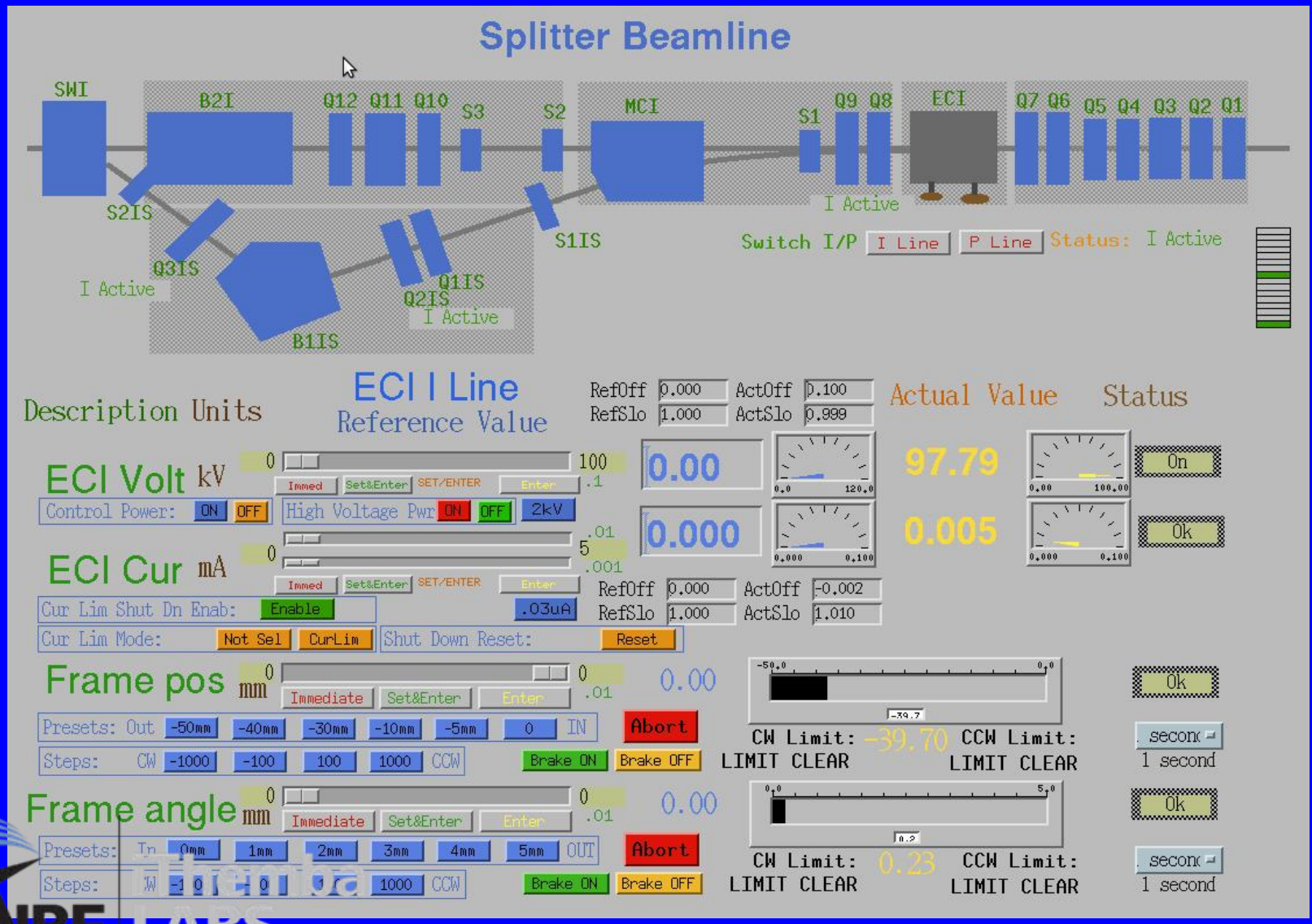
Xenon beam current produced by the Grenoble Test Source (GTS2)



New Digital Low Level RF Control System



EPICS Control System

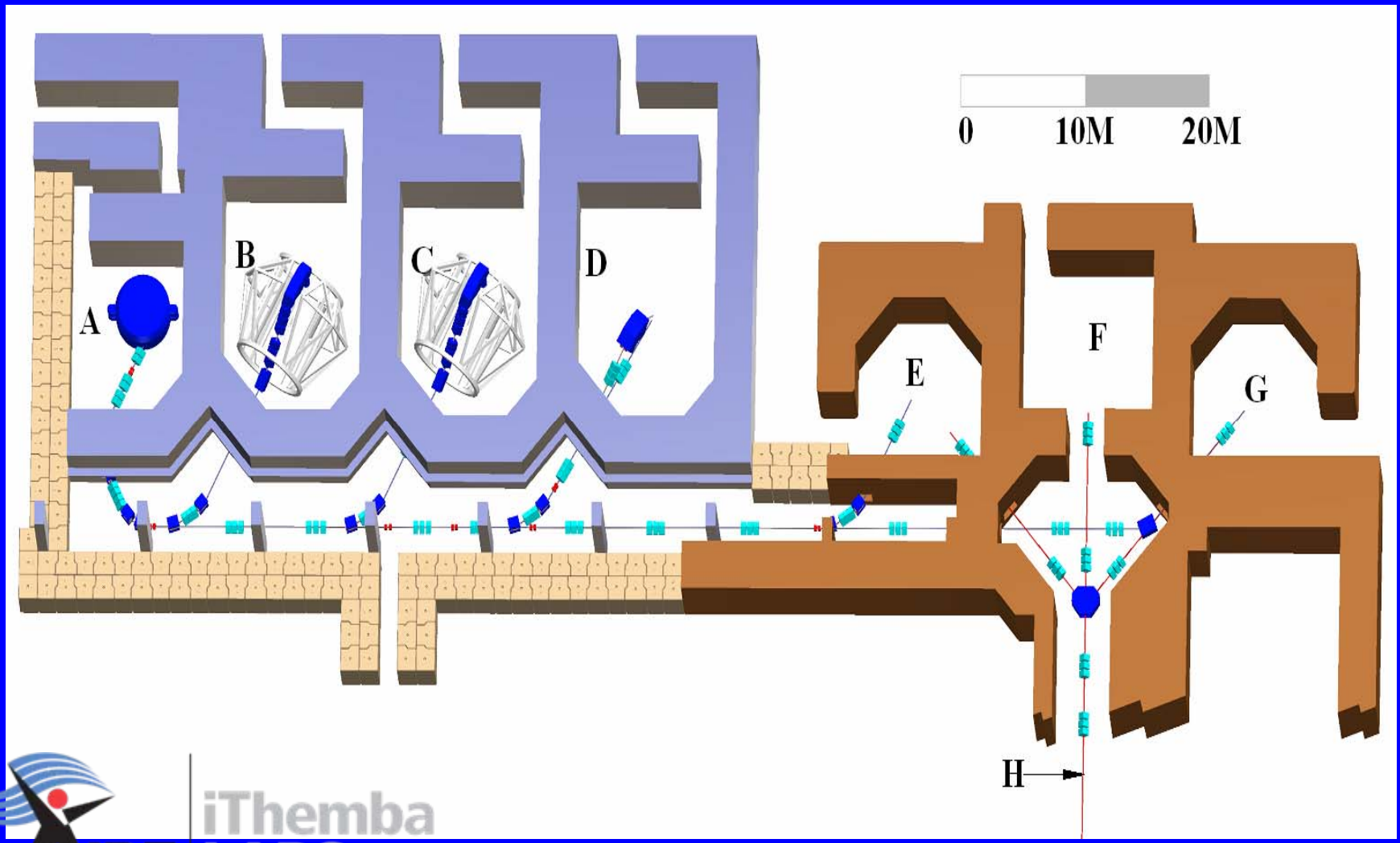


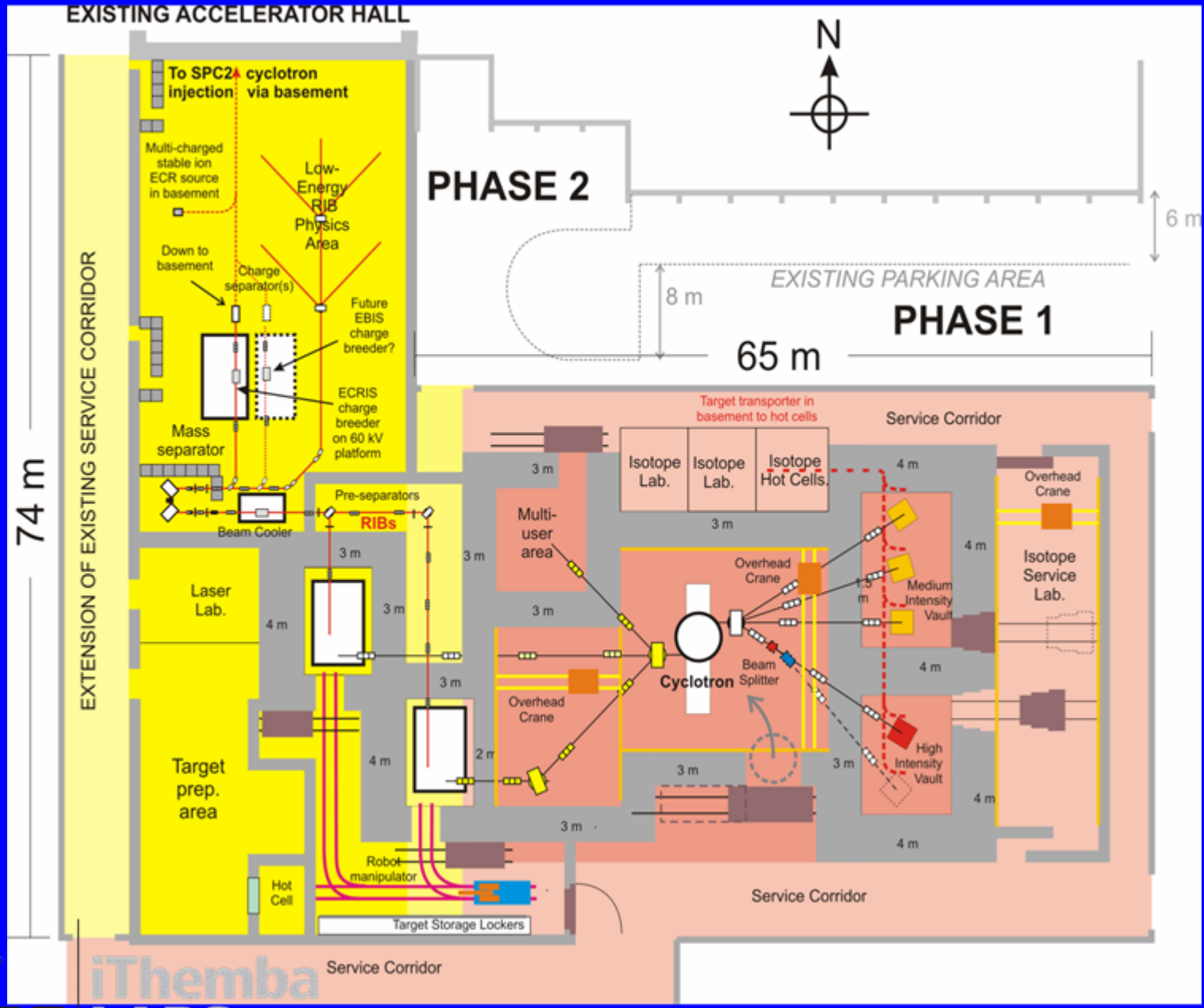
Control Room

11 MeV H^- PET Cyclotron – ECLIPSE

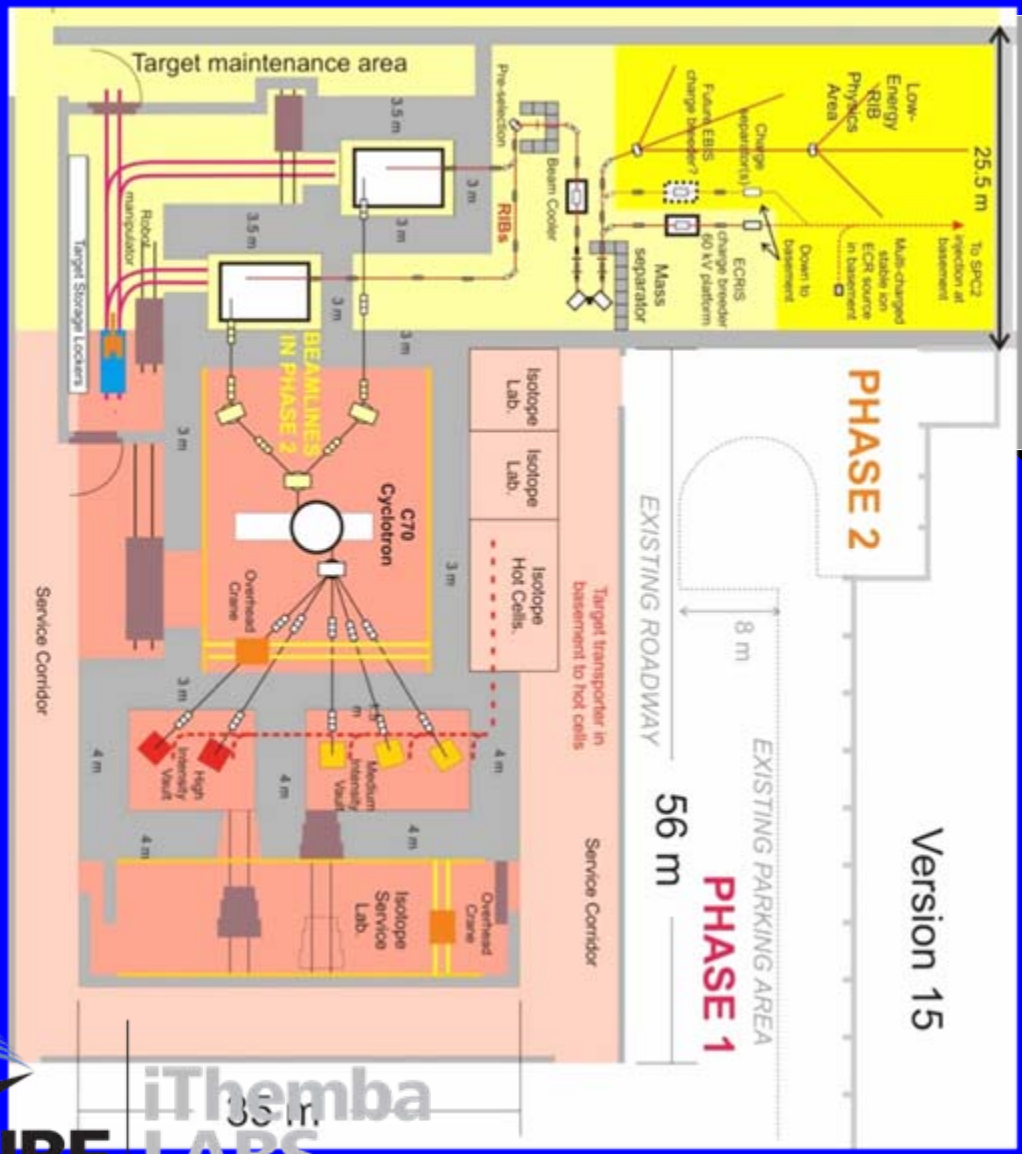
Ice Building Machine

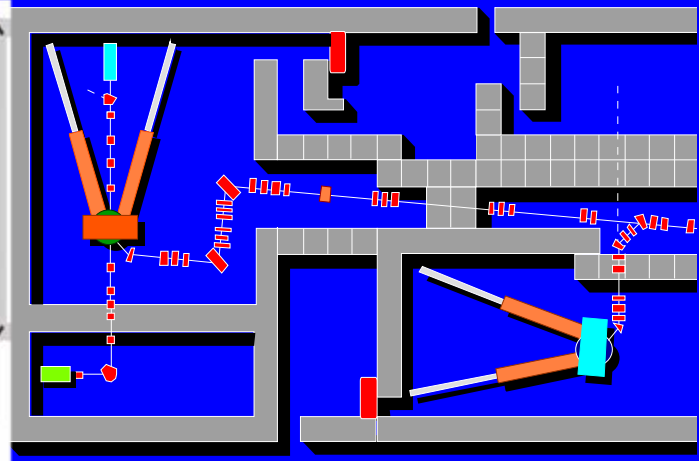
Proposed Dedicated Facility for Proton Therapy

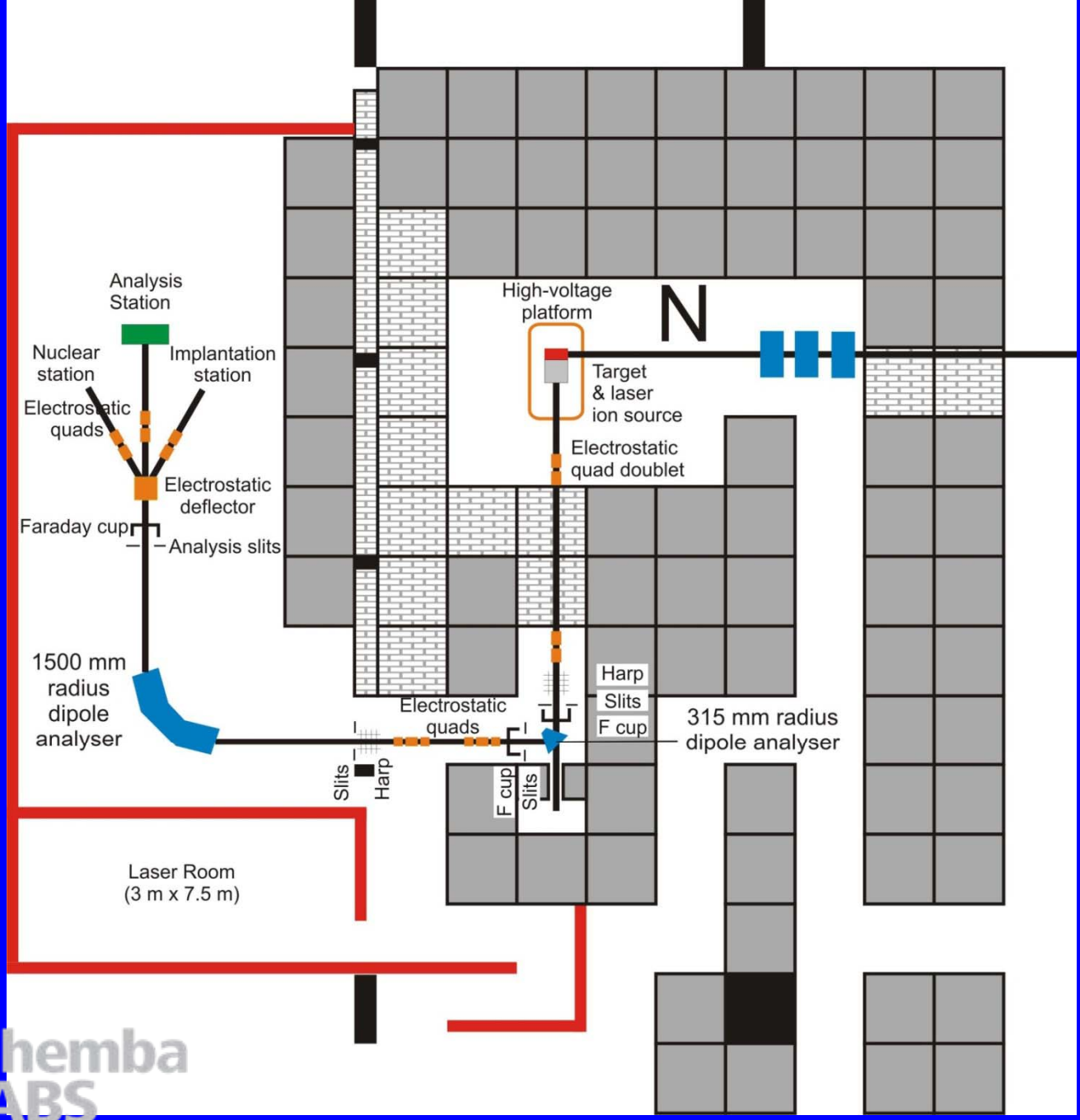



EXISTING ACCELERATOR HALL
N
PHASE 2
6 m
EXISTING PARKING AREA
8 m
PHASE 1
65 m
74 m
EXTENSION OF EXISTING SERVICE CORRIDOR
To SPC2 injection cyclotron via basement
Multi-charged stable ion ECR source in basement
Low-Energy RIB Physics Area
Down to basement
Charge separator(s)
Future EBIS charge breeder?
ECRIS charge breeder on 60 kV platform
Mass separator
Beam Cooler
Pre-separators
RIBs
Laser Lab.
Target prep. area
Hot Cell
Robot manipulator
Target Storage Lockers
Target transporter in basement to hot cells
Service Corridor
Isotope Lab.
Isotope Lab.
Isotope Hot Cells
Multi-user area
Overhead Crane
Cyclotron
Beam Splitter
Medium Intensity Vault
High Intensity Vault
Isotope Service Lab.
Overhead Crane
Service Corridor
Service Corridor
3 m
4 m
2 m
1.5 m

Proposed Radioactive Beam Facility






Analysis Station
Nuclear station
Implantation station
Electrostatic quads
Electrostatic deflector
Faraday cup
Analysis slits
1500 mm radius dipole analyser
Laser Room (3 m x 7.5 m)
High-voltage platform
N
Target & laser ion source
Electrostatic quad doublet
Harp
Slits
F cup
Electrostatic quads
315 mm radius dipole analyser
Slits
Harp
F cup
Slits

Thank you

The Separated-sector cyclotron