HiRadMat
High-Radiation to Materials

HiRadMat
(for) Beam Instrumentation

Adrian Fabich

BE/BI Technical Board
19. February 2015

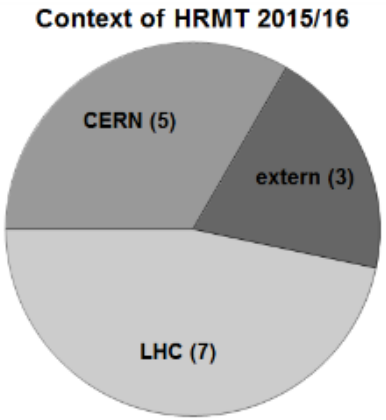
EuCARD-2 is co-funded by the partners and the European Commission under Capacities 7th Framework Programme, Grant Agreement 312453

EN Engineering Department

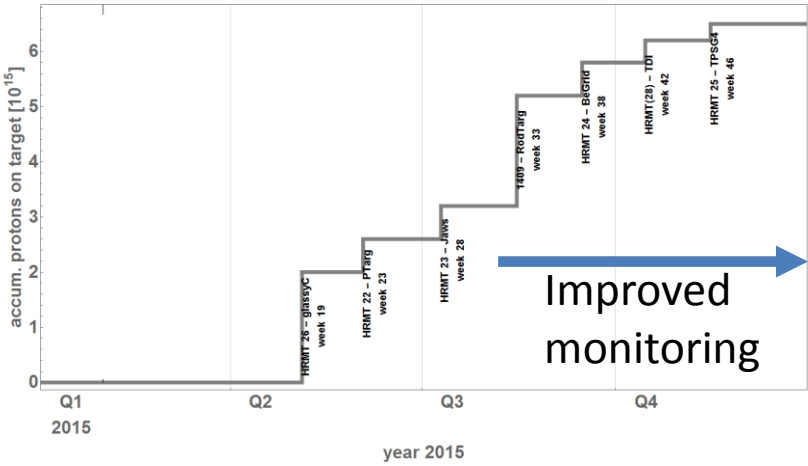
CERN

HiRadMat beam times in 2015/2016

- 15 proposals received
  - including 2 parasitic experiments



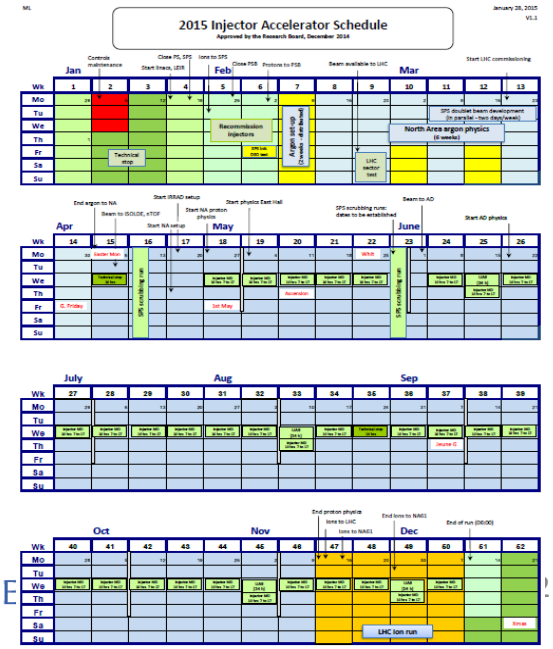
BLM
TPSG4
GlassyC windows
BPM diamond
Berrylium samples
Supra sextupole
Collimator jaws
Rotating collimator
AD target
UA9 crystal
Microphone
High power target
Fiber BLM
TDI
Collimator materials



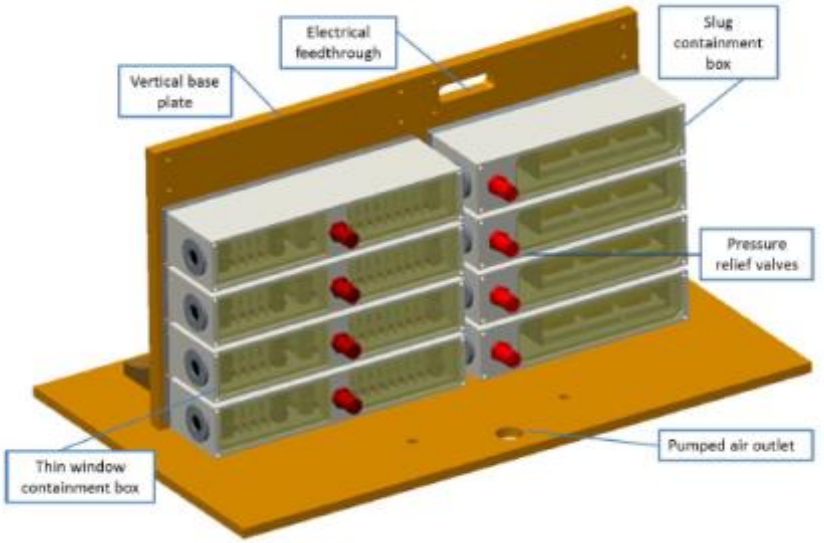
– HiRadMat Scientific And Technical Committee
  - 9 proposals fully approved
  - Proposals received most recently will be reviewed in the coming months

Accumulated SPS cycle time

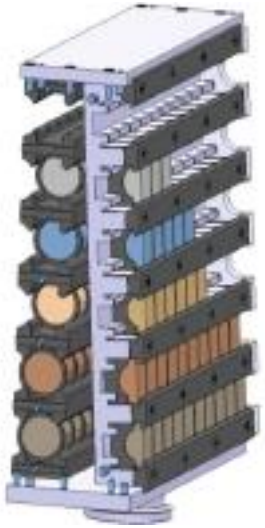
- 2012: 48 hours
- 2014: 8 hours (estimate)
- 2015: 75 hours (estimate)

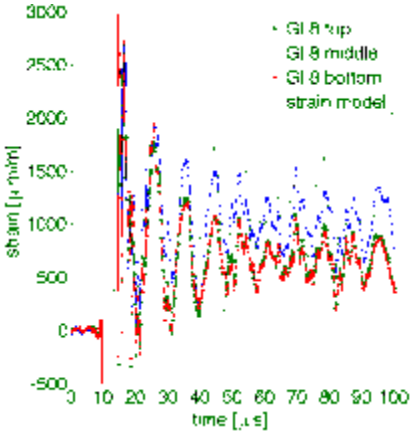


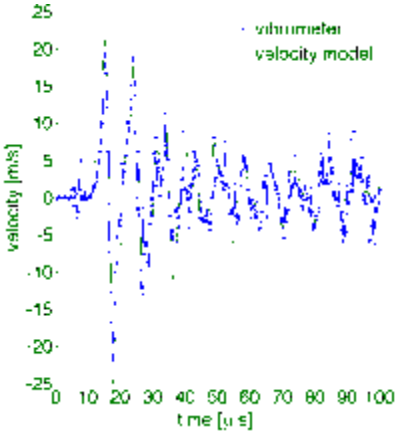
TPSG4, C. Baud



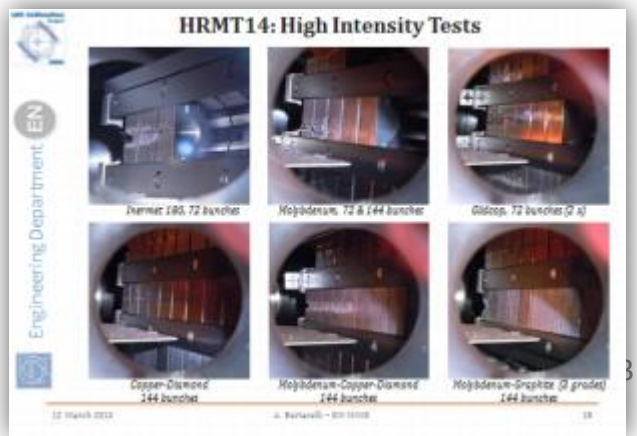
Beryllium windows, P. Hurh (FNAL)

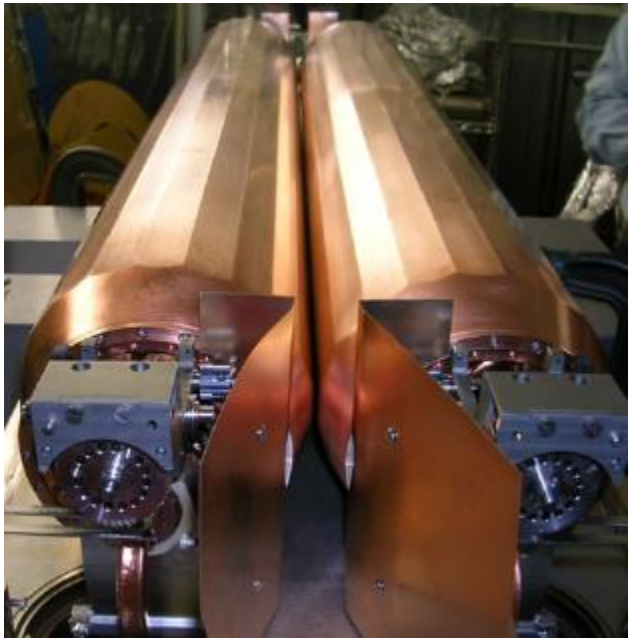




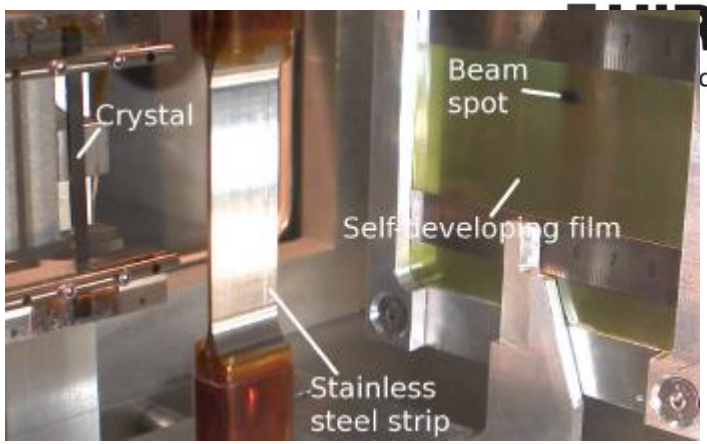


Collimator studies, A. Bertarelli

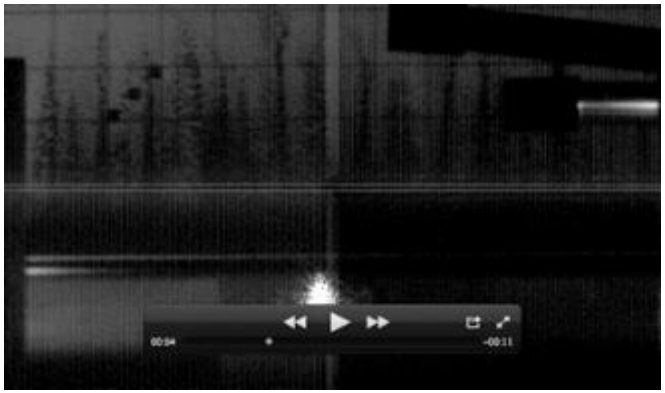




Rotating Collimator, S. Redaelli

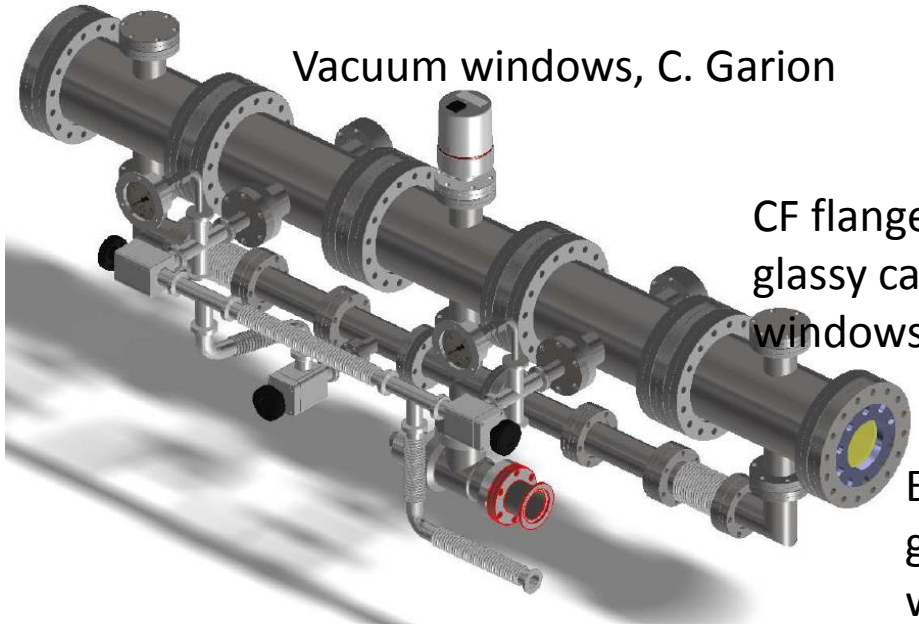


CRY 2
A. Lechner



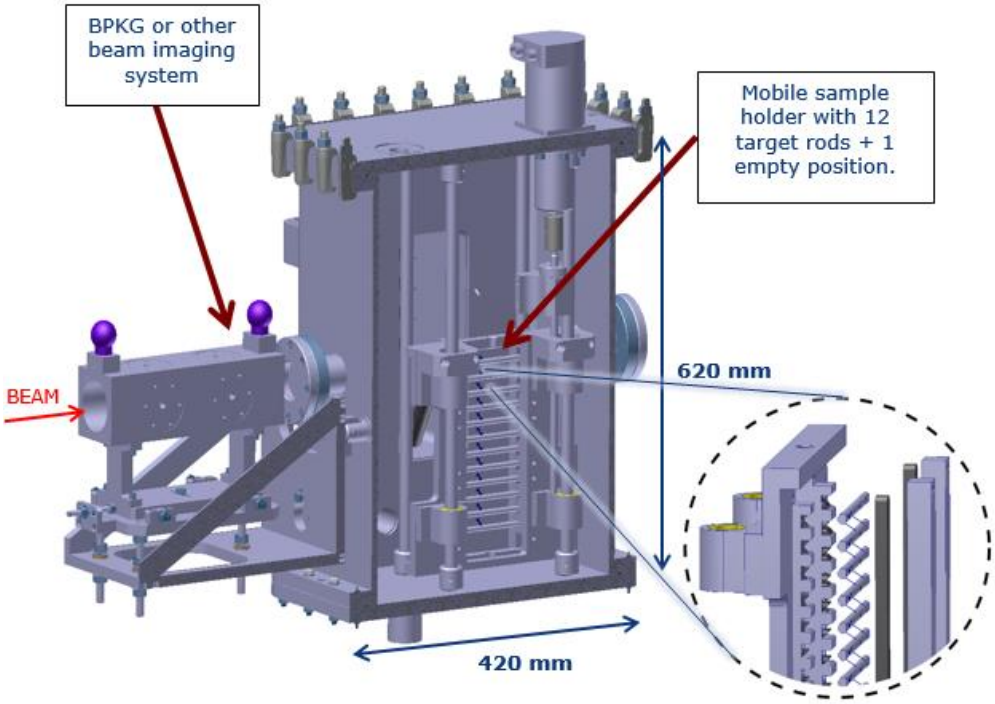
High power target, N. Charitonidis
C. Densham

Vacuum windows, C. Garion



CF flange with glassy carbon windows

End CF flange with glassy carbon windows

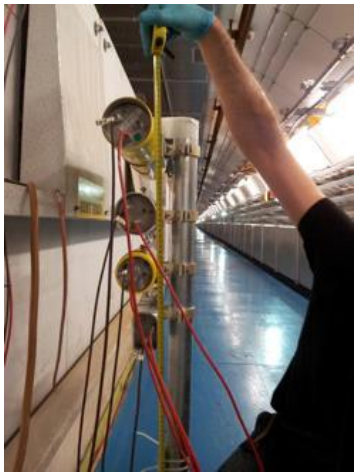


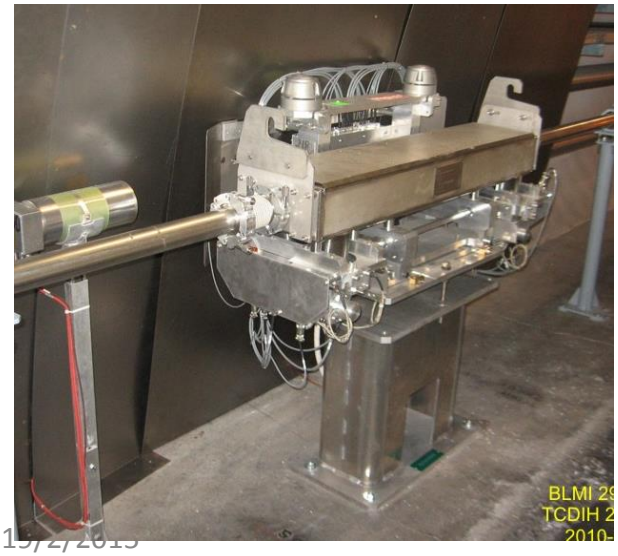
HRMT 27
Rod Target

M. Calviani et al.

HRMT 19
BLMs

B. Dehning et al.

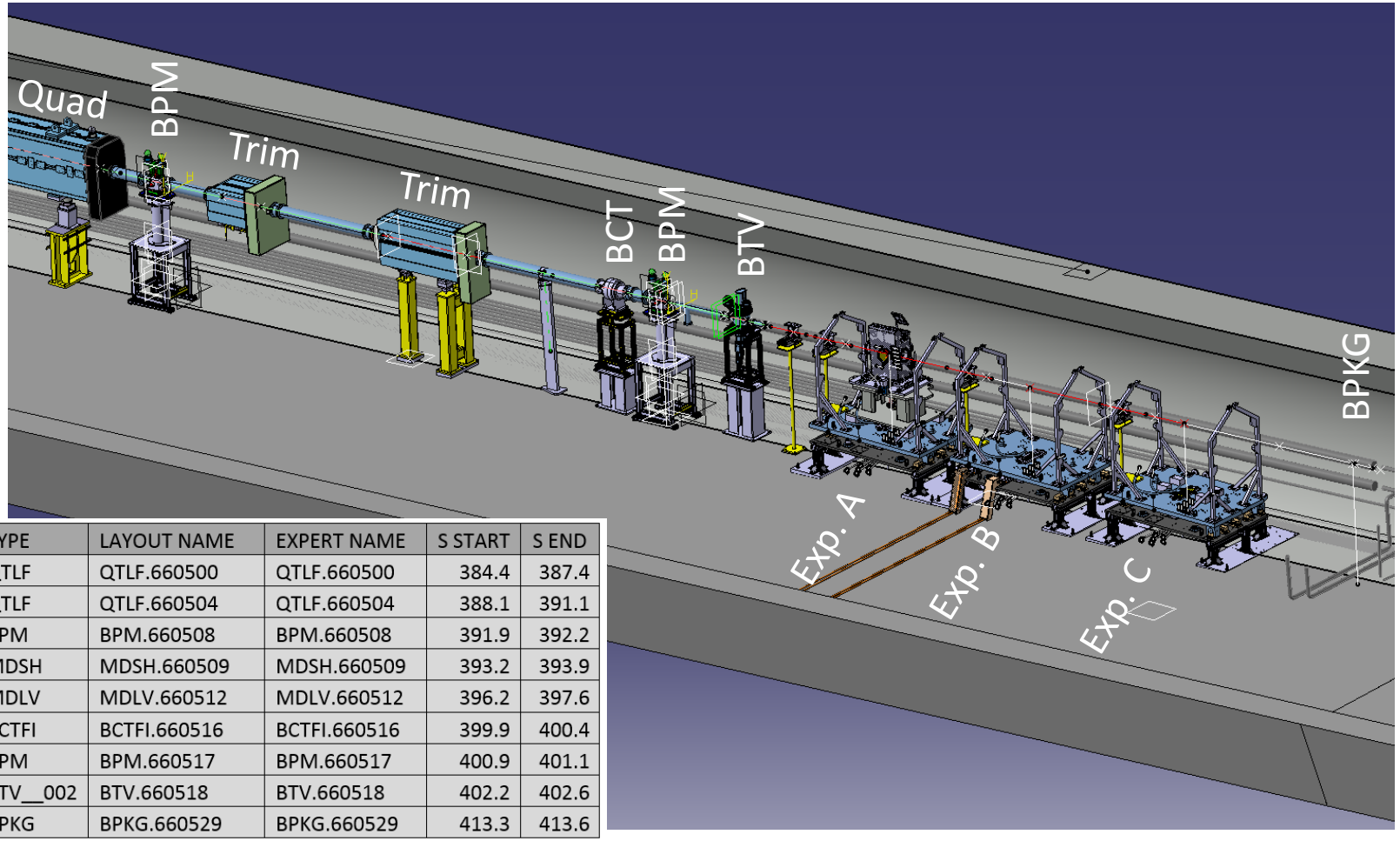




proposal 1420
TCDI

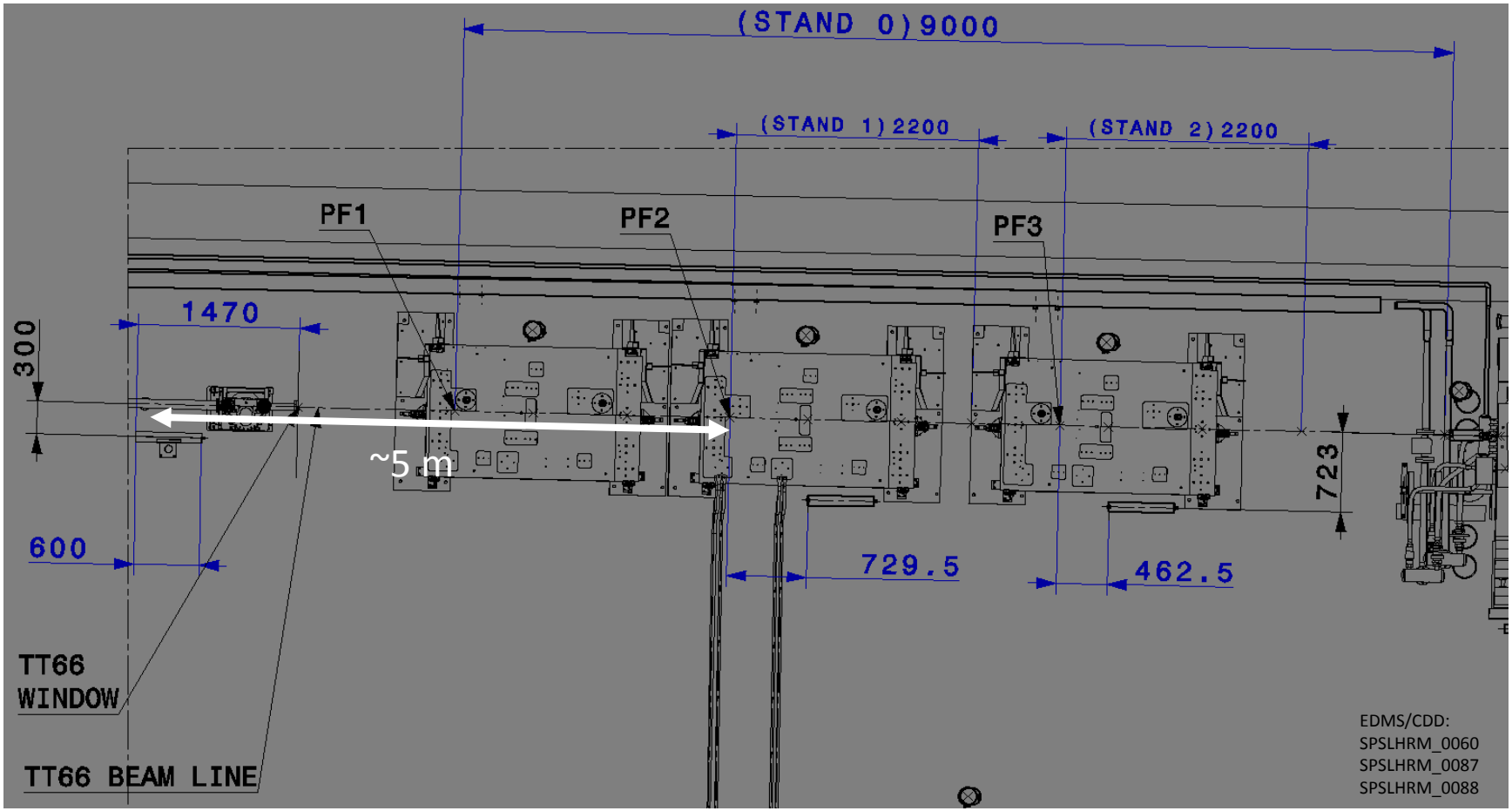
A. Lechner et al.

TNC beam line



TYPE	LAYOUT NAME	EXPERT NAME	S START	S END
QTLF	QTLF.660500	QTLF.660500	384.4	387.4
QTLF	QTLF.660504	QTLF.660504	388.1	391.1
BPM	BPM.660508	BPM.660508	391.9	392.2
MDSH	MDSH.660509	MDSH.660509	393.2	393.9
MDLV	MDLV.660512	MDLV.660512	396.2	397.6
BCTFI	BCTFI.660516	BCTFI.660516	399.9	400.4
BPM	BPM.660517	BPM.660517	400.9	401.1
BTV__002	BTV.660518	BTV.660518	402.2	402.6
BPKG	BPKG.660529	BPKG.660529	413.3	413.6

HRM Experimental Area



Improved BPMonitoring at experiment

Today: Beam position at experiment with uncertainty

- Varying beam trajectory
- Lacking position correlation of Experiment ⇔ BPM

- Additional BPM requested in 2014 by users
  - HRMT 27, HRMT 24, proposal 1420, proposal 1410 …

Determine the beam position with a precision of 0.1 mm wrt the experiment

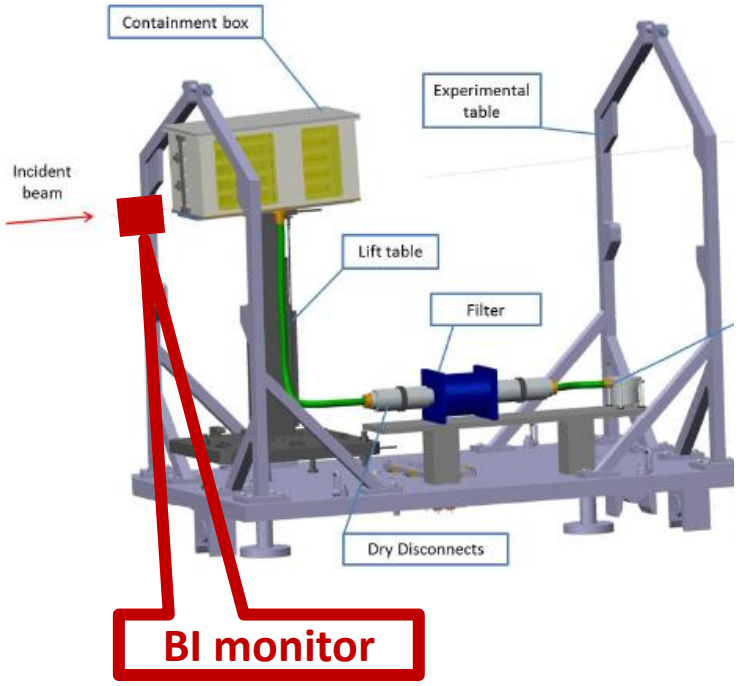
Beam parameter space

LHC injection-like beam

- 440 GeV proton
- 25 ns (50 ns)
- 1-288 bunches/pulse
- 10^{10} to $2*10^{11}$ protons/bunch
- Beam radius: 0.1 - 2 mm (sigma h/v)

Integration/installation

- BI monitor mounted just upstream of experiment
- BI monitor will be mounted on mobile table/experimental setup
- Allows alignment survey in laboratory conditions
- Placed in air
  - Vac or gas environment could be provided.



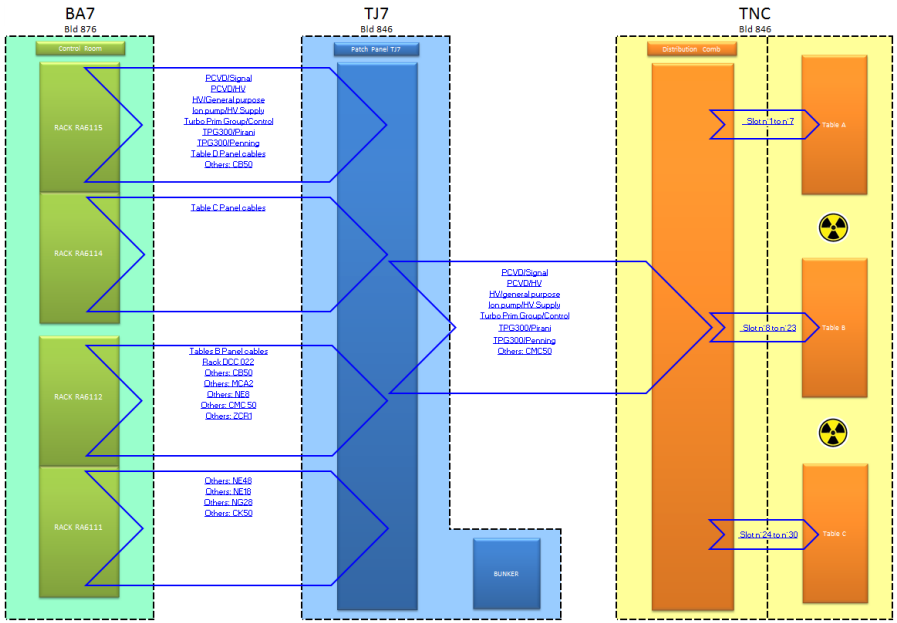
Operational aspects

- Online measurement of single pulses
  - Pulse-to-pulse durations can vary from CNGS-like to 1 pulse/60 min
- Single bunch measurement is not a requirement.
- Provided by BE/BI to experimental users
- Managed/maintained by BE/BI
  - EN/MEF will provide integration/installation support
- Timber logged data provided to users
- Beam based alignment
  - can be considered if required
  - Correlating BI position measurement with experimental setup
  - Based on BLM/pCVD detectors (possibly provided by EN/MEF)
  - At low intensities with almost unlimited pulses

Cabling already available

Cabling database EDMS 1415953

- Permanent cabling installed (e.g. CK50)
- Connecting TNC to HRM control room



Conclusions

- Determine beam position with 0.1 mm absolute precision wrt experiment
- Online measurement in the full parameter space of the SPS beam
- Availability from August 2015 required

Appreciating the BE/BI
expertise and support


CERN
EN
ENGINEERING
DEPARTMENT

BACK-UP

HiRadMat - Structure [Operations]

HiRadMat
High-Radiation to Materials

A & T Sector Management

HiRadMat Facility
Physicist in charge: ***A. Fabich***
Alternate: *I. Efthymiopoulos*

IEFC Committee

Beam & Facility Operation

Commissioning Coordination
M. Meddahi

Beam Operations
K. Cornelis, V. Kain,
CCC(SPS, PS) operators

Facility Support
- Engineering studies : S. Evrard
- Area Manager : D.DePaoli (A. Bouvard)
- RP support : C. Theis, K. Weiss
- Handling/transport : Y. Seraphin, J.L. Grenard

Experiments

HiRadMat Scientific Board
- I. Efthymiopoulos - CERN
- S. Evrard - CERN
- A. Fabich - CERN (secretary)
- *Y. Kadi - CERN*
- B. Riemer - SNS
- **N. Simos - BNL (chair)**
- S. Sgobba - CERN
- M. Wohlmuther - PSI

HiRadMat Technical Board
- K. Cornelis - SPS Beam
- S. Evrard - HiRadMat (secretary)
- **A. Fabich - HiRadMat (chair)**
- S. Gilardoni - PS beam
- A. Henriques - DSG/SEE
- J. Pedersen - EN DSO
- A. Pardons - EN RSO
- M. Tavlet - BE DSO
- C. Theis - DGS/RP

if needed:
- *Y. Algoet - DGS/RP*
- *J. L. Grenard - EN/HE*
- K. Weiss - DGS/RP

During operations:
- bi-weekly Users meeting
- weekly meeting of EAM Team

EN Engineering Department

HiRadMat Scientific Board

HiRadMat
High-Radiation to Materials

- Is the executive body that manages the facility.
- Evaluates the scientific merit of the proposed experiments, their feasibility, the proposed online information during beam time, the post-irradiation analysis plans and the expected results and publications to the interest of the scientific community.
- Distributes the EUCARD Transnational Access funds - contractual obligation from EC
- **Members:**

Bernie RIEMER, MSc
Senior Research Engineer
ORNL/SNS
Target development team leader

Nick SIMOS, Ph.D, P.E (chair)
Senior Scientist
Nuclear Science Department & Photon Sciences Directorate BNL
Project leader of BNL Linac Isotope Producer (BLIP)

Michael WOHLMUTHER, PhD
Senior Scientist
Paul Sherrer Institute - PSI
Radiation transport & Multiphysics Group
Head of Target Development Group

Adrian FABICH (secretary)
Beam physicist – EN/MEF group

Ilias EFTHYMIOPOULOS
Senior beam physicist – EN/MEF group

Stefano SGOBBA
Materials Engineer – EN/MEF group

Sebastien EVRARD
Mechanical Engineer – EN/MEF group

Stefano Redaelli
Mechanical Engineer - BE/ABP group

Alfredo Ferrari
Senior physicist - EN/STI group

EN Engineering Department

Experiment Selection Criteria

HiRadMat
High-Radiation to Materials

- Experiments are approved by the **Scientific Board** based on scientific arguments
  - scientific interest of the experiment, feasibility, online information and post-irradiation analysis
  - expected results and publications to the interest of the scientific community
  - Approval validated by the **Technical Board** based on integration, beam operation, safety and radioactive waste arguments
- So far we could distribute all accepted experiments in the available beam slots
- If a scheduling problem arises, the **Scientific Board** will be called to arbitrate
  - discussion with the experiments to reflect on scheduling flexibility,
  - consult with other experts to understand the technical or scientific urgency of the experiment,

if no solution is found:

- prepare recommendation and report to IEFC and/or A&T Sector Management to decide