Electronics Radiation Tests with Protons

CBM COSY Beam Test in August 2014

Overview Presentation

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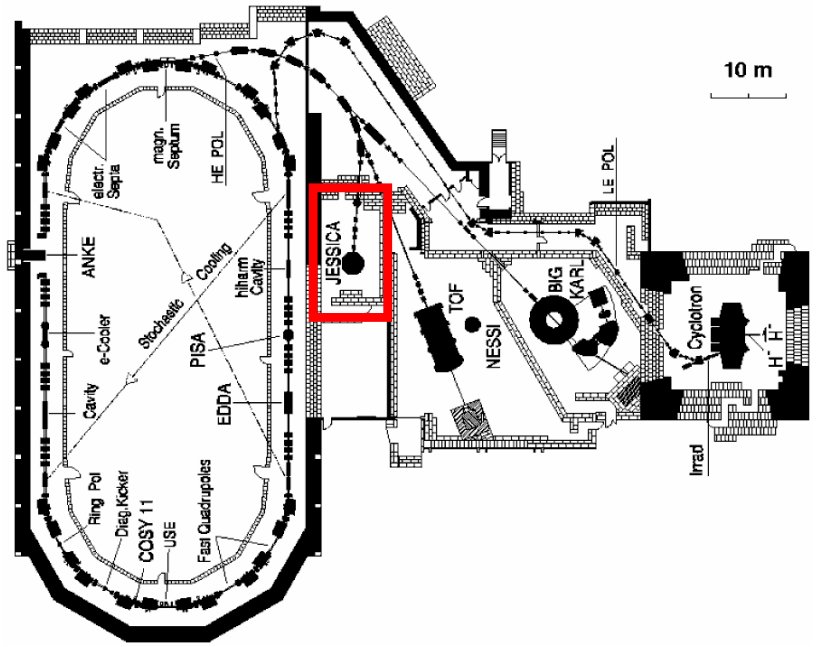
GSI Darmstadt

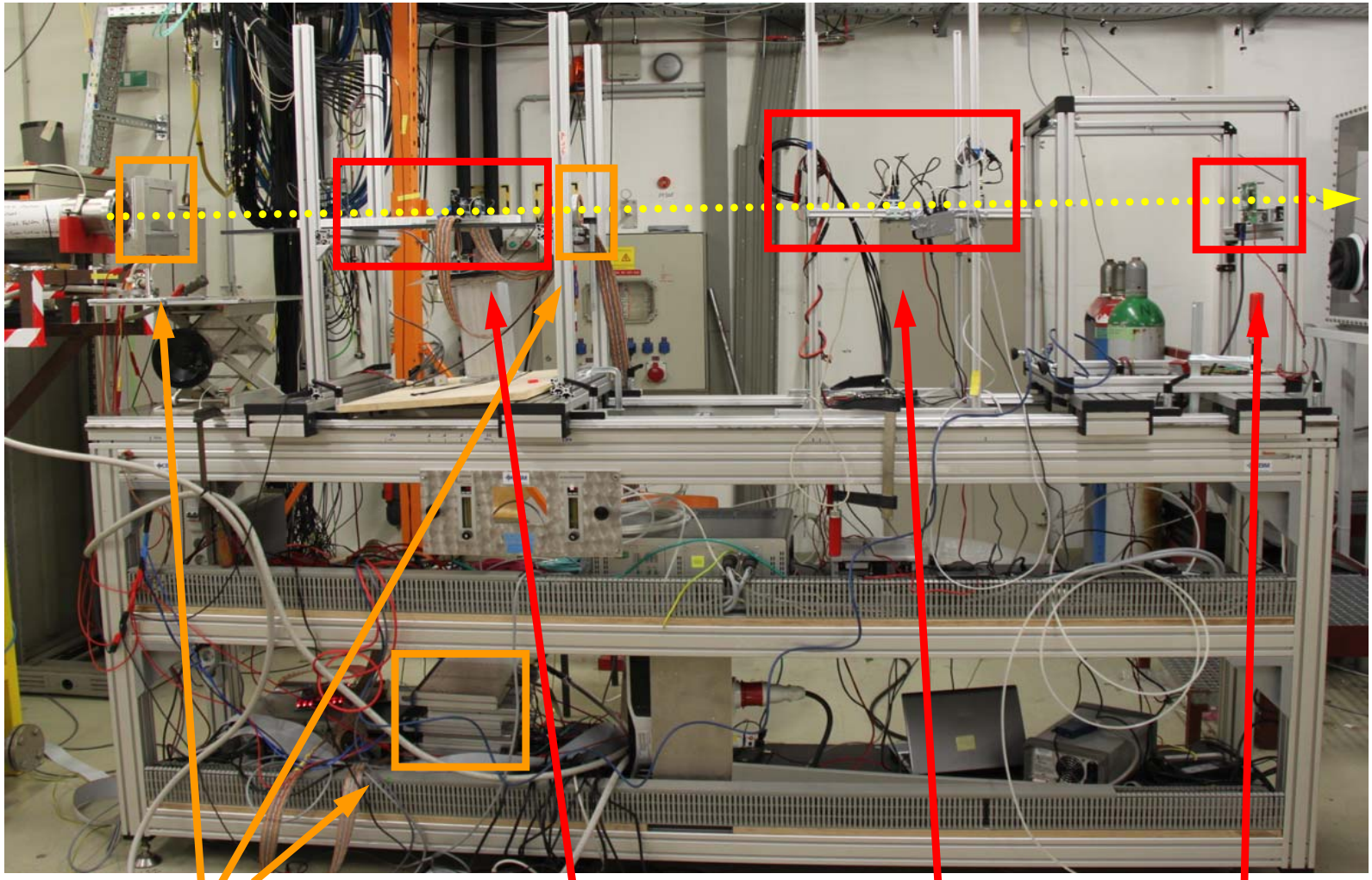
(24th CBM-Collaboration Meeting)
September 2014

Beam Parameter

- Location: FZ Jülich / COSY / JESSICA cave
- Beam time: 4. to 8. August 2014
- Beam:
  - ~ 2 GeV protons
  - between 3.0 and 6.3 · 10^9 protons/spill
    - in average 3.8 and 7.9 · 10^8 protons per second
    - or around 1.0 to 2.2 · 10^9 protons per second (in spill peak)
  - beam diameter at beginning of table:
    σ_x = 3.1mm σ_y = 2.6mm
  - beam on target: 8s, repetition rate: 36 s
- Participants:
  - IRI, University Frankfurt
  - ZITI, University Heidelberg
  - GSI Darmstadt
- On-Site:
  - J. Gebelein, P. Koczon, M. Krieger, S. Löchner, A. Oancea, C. Stüllein, M. Witthaus



Experimental Setup - Overview



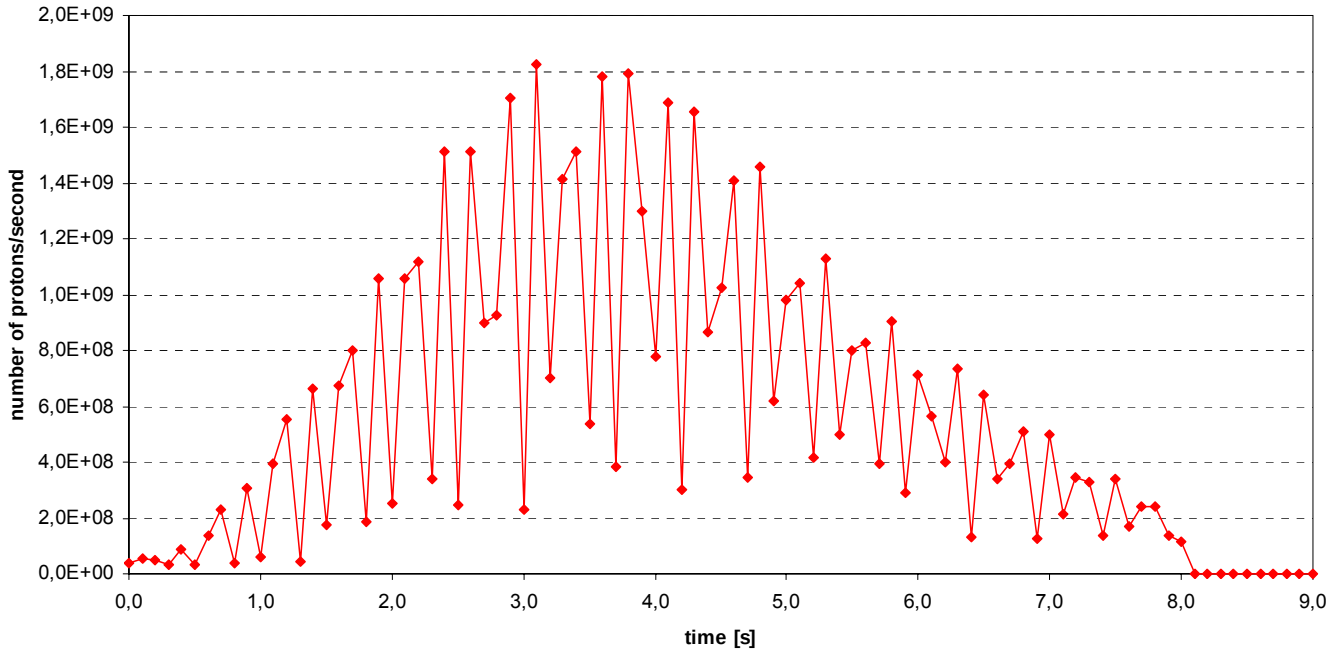
Beam Diagnostic (I)

Typical COSY spill extraction profile in 2014

- 8s beam extraction
- 28s break (for “refill” of synchrotron)

Ionizing Chamber
(from GSI Detector-Lab Department)

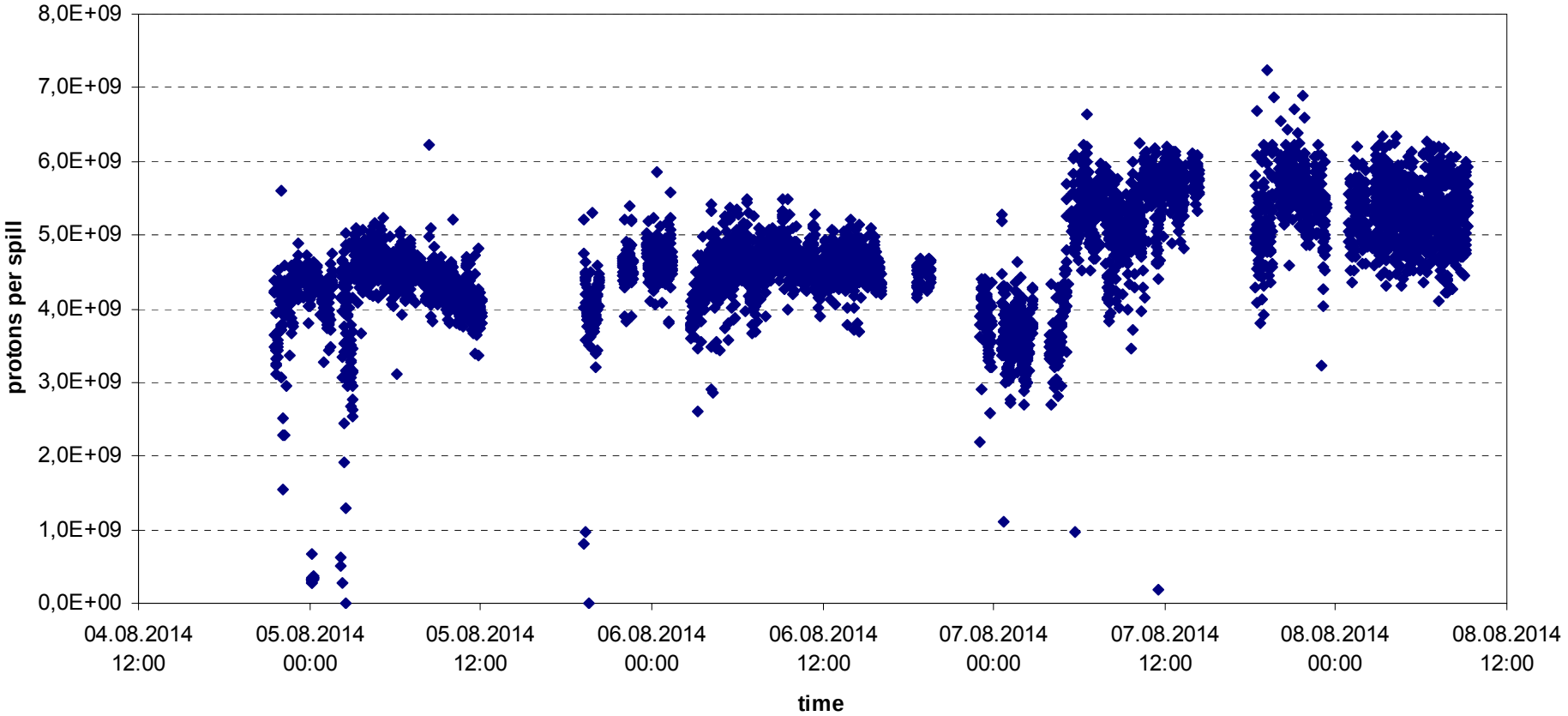
- Biased with 1kV
- Readout with the POLAND beam diagnostic system



for this example: $5.2 \cdot 10^9$ protons are in the spill

Beam Diagnostic (II)

Ionizing Chamber – Number of Protons per spill



First (GSI) Results from CBM COSY 2014

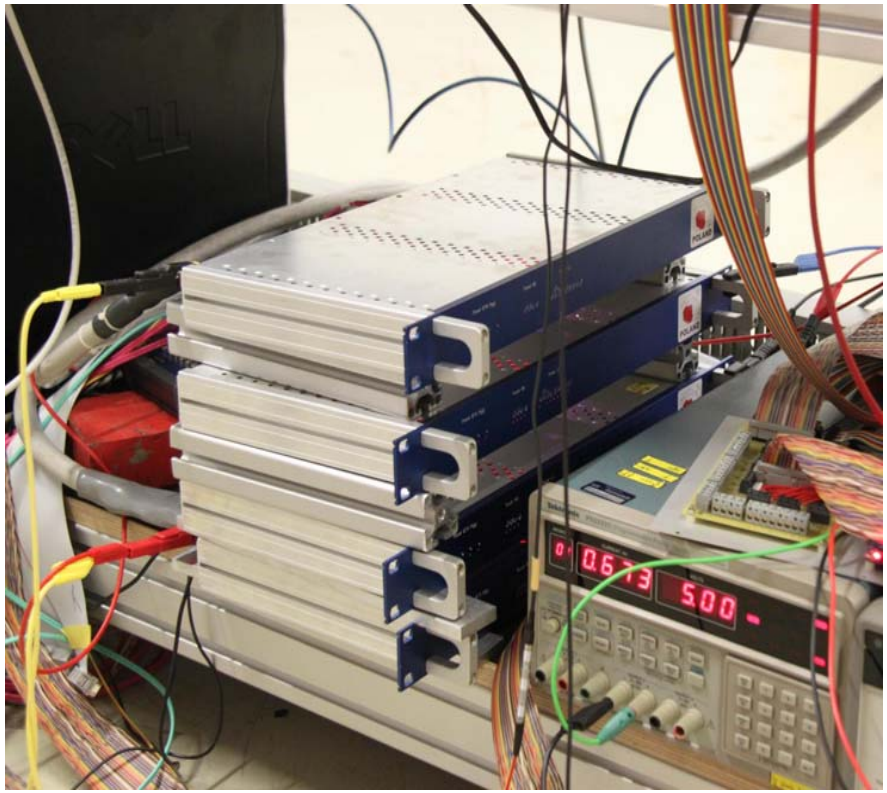
Finally 4 nights and 3 days with beam on target:

- ≈ $2.60 \cdot 10^{13}$ protons delivered from COSY
  ➔ ~ 7x more than 2013
- Beam profile much better than in 2013
- All diagnostic devices worked
- All 10 Power regulator LTC 3605 "died" between $1.0 \cdot 10^{10}$ and $4.6 \cdot 10^{11}$ protons

More results and detailed analysis of data will upcoming after my holiday in some weeks.

POLAND Test at COSY 2014

- 3 POLAND units (+1 spare)
  - 2 for SEM grid (X and Y)
  - 1 for IC readout
- Detailed test of new FPGA program
- Minimum limit tests of the POLAND system
  - Offset correction (at slow extraction mode)
  - Auto calibration of DACs
- Test of POLAND without offset DACs



Thanks to all...

M. Witthaus A. Oancea C. Stüllein
M. Krieger J. Gebelein S. Löchner

on photo missing:
P. Koczon