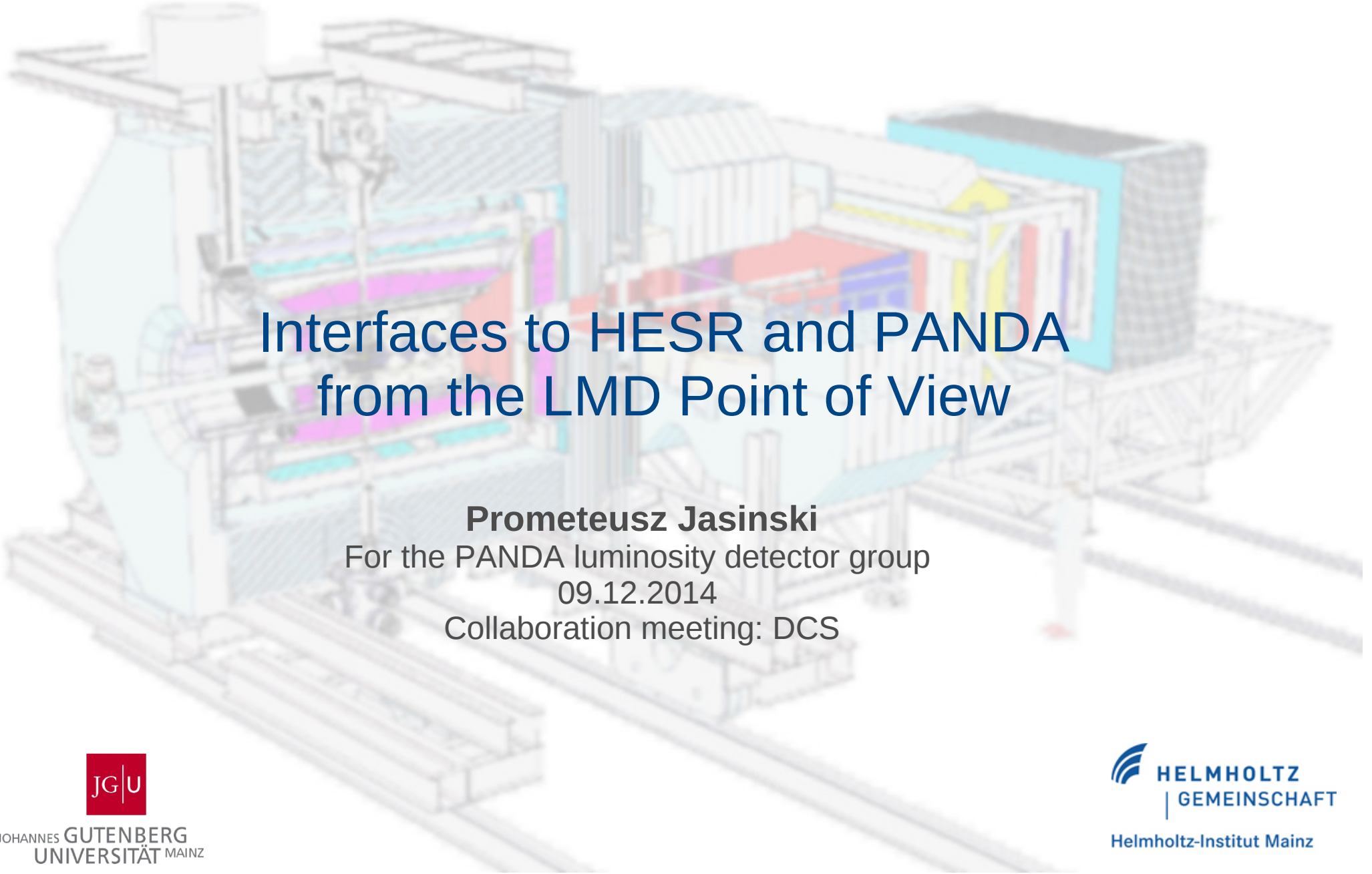


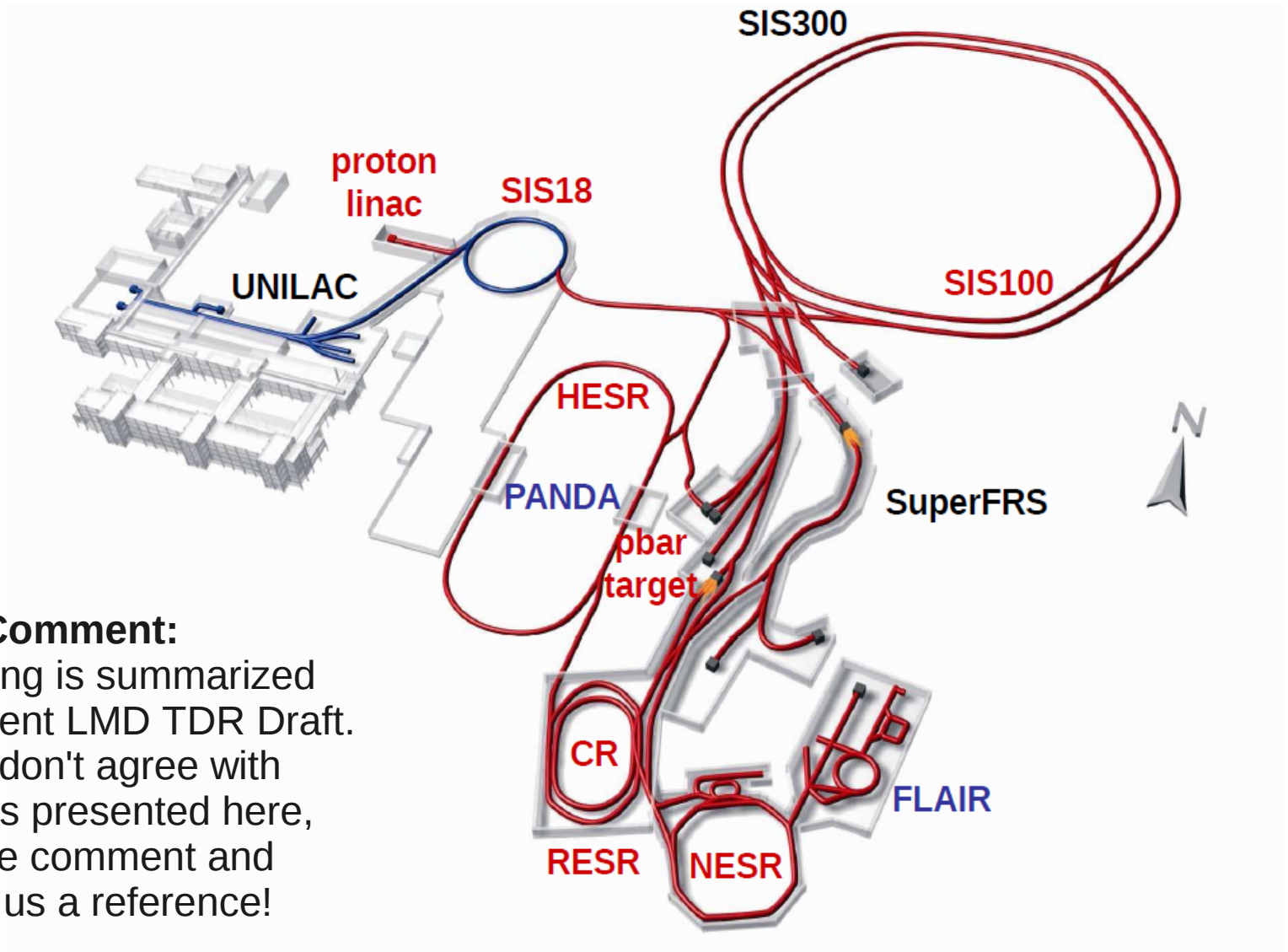
Interfaces to HESR and PANDA from the LMD Point of View

Prometeusz Jasinski
For the PANDA luminosity detector group
09.12.2014
Collaboration meeting: DCS

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

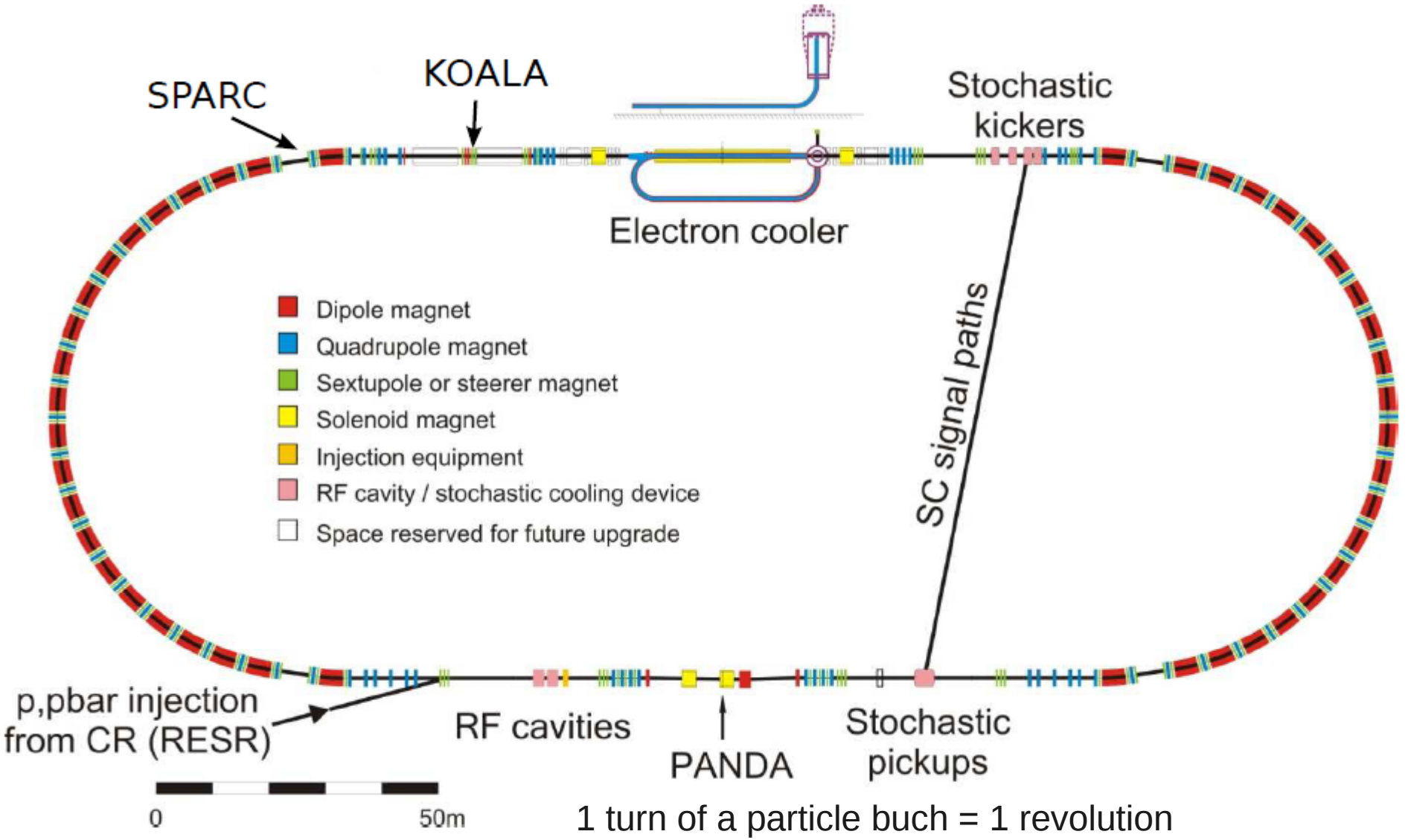
HELMHOLTZ GEMEINSCHAFT
Helmholtz-Institut Mainz

Some „facts“ on HESR



Comment:
Everything is summarized
In our current LMD TDR Draft.
If you don't agree with
Numbers presented here,
Please comment and
Send us a reference!

Some „facts“ on HESR



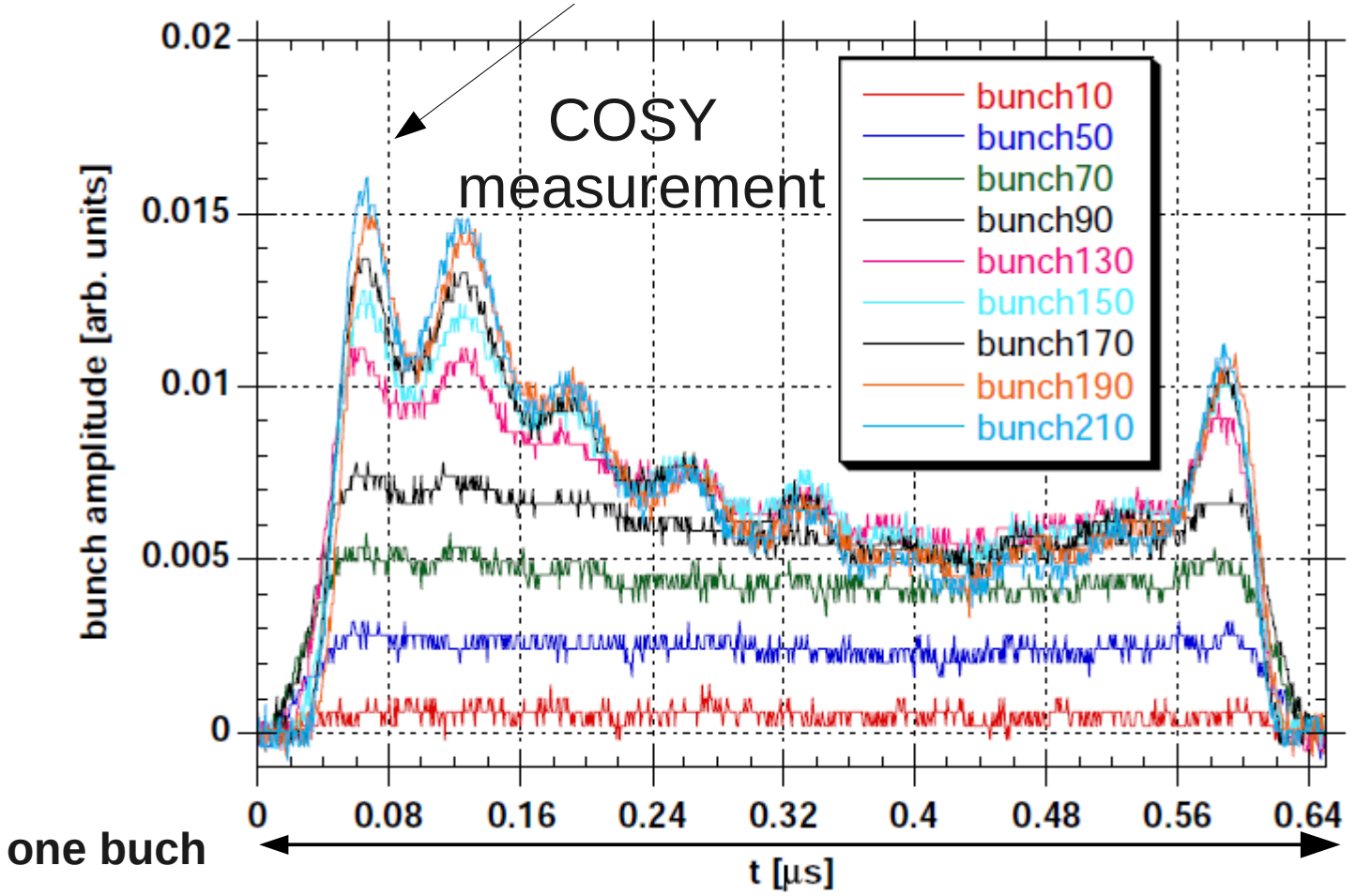
1 turn of a particle buch = 1 revolution

Revolution frequencies f = 443 kHz – 521 kHz (1.5-15 GeV/c)

Revolution period T = **2.26µs – 1.9µs** (1.5 – 15 GeV/c)

Bunch Structure in Barrier Bucket Mode (Physics at PANDA)

Beam gets structure due to ripple on the barrier voltage



MOPD068 Proceedings of IPAC'10, Kyoto, Japan

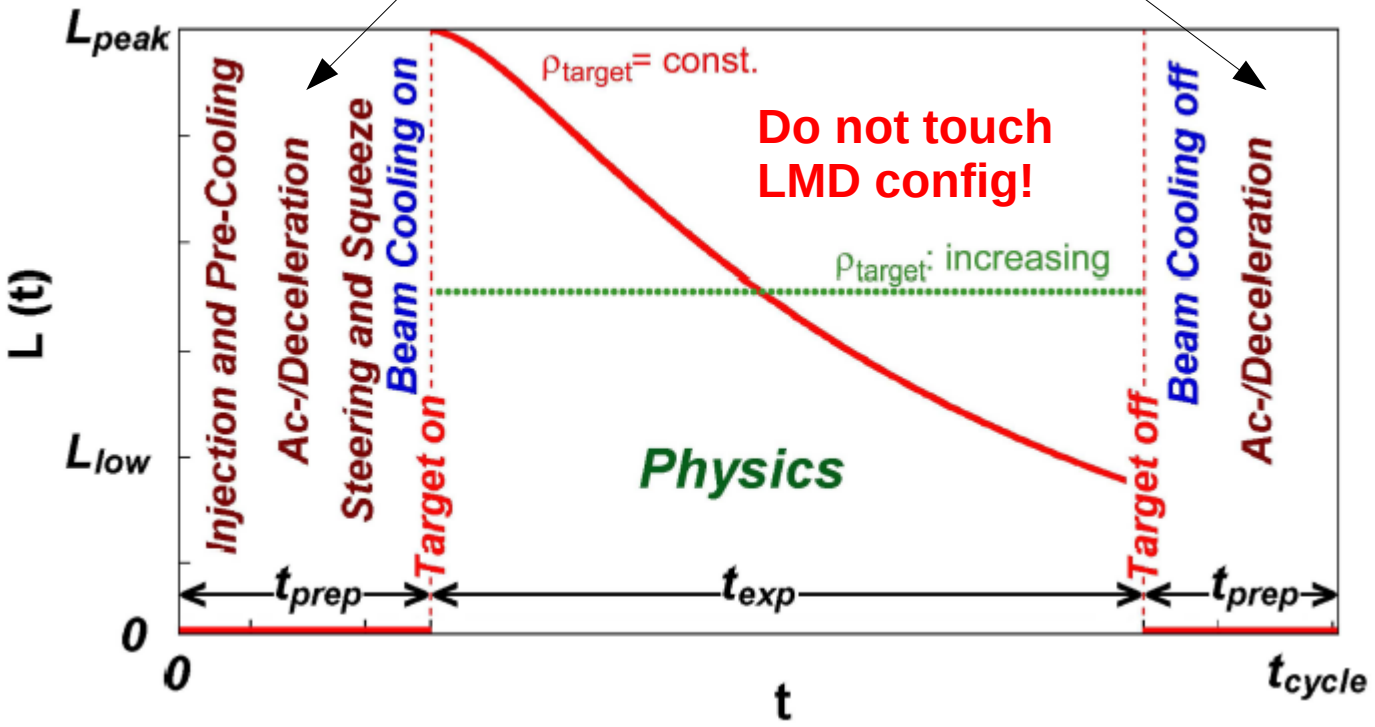
STOCHASTIC MOMENTUM COOLING EXPERIMENTS WITH A BARRIER BUCKET CAVITY AND INTERNAL TARGETS AT COSY-JUELICH IN PREPARATION FOR HESR AT FAIR

H. Stockhorst, R. Maier, D. Prasuhn and R. Stassen, Forschungszentrum Jülich GmbH, Germany
T. Katayama, Tokyo

PANDA future conditions:
DC beam with a fill factor of 80%

The Luminsity Profile

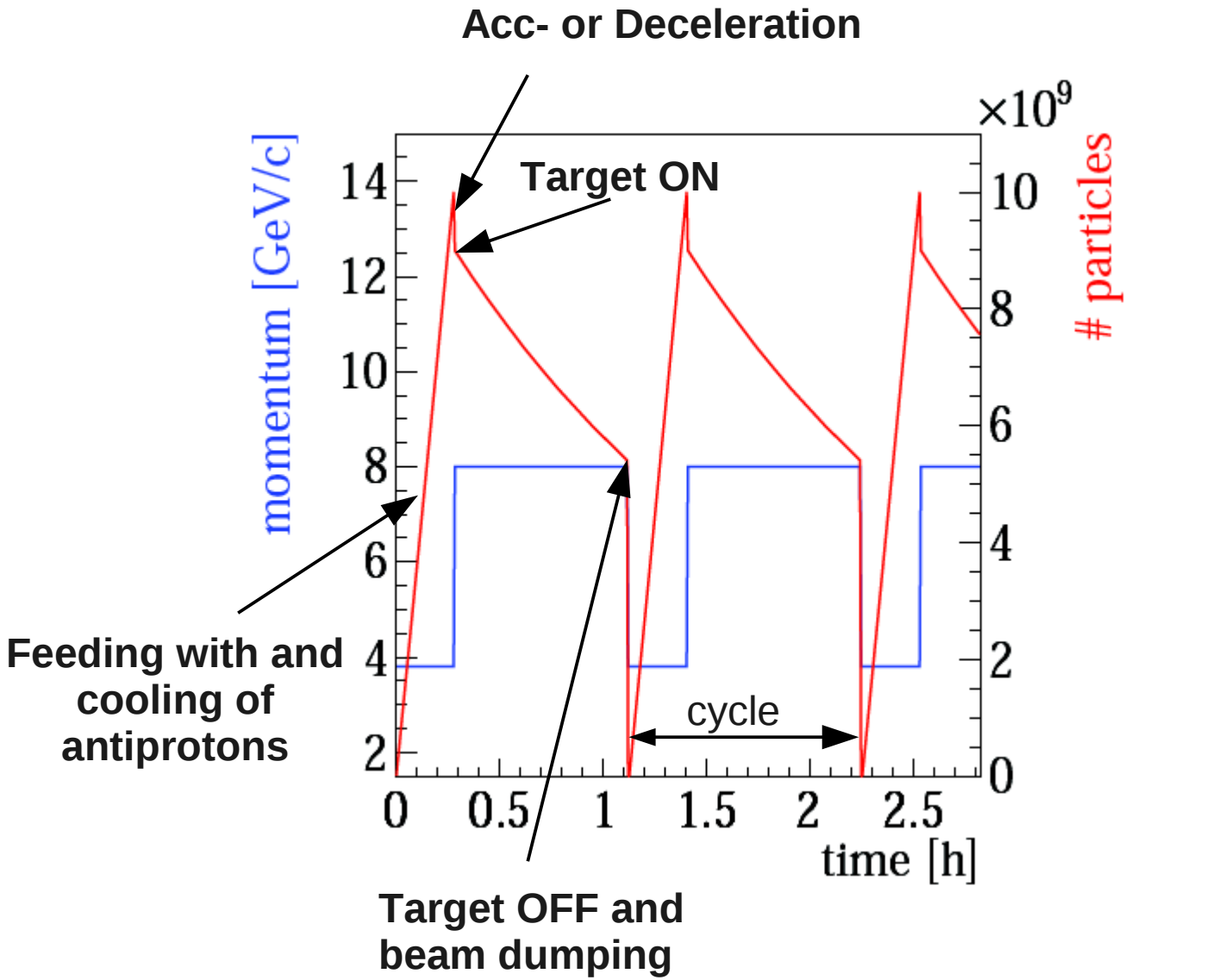
LMD Configuration
only during beam preparation!



t_exp = 9.5 min – 32 min ; t_prep = 2 min – 5 min

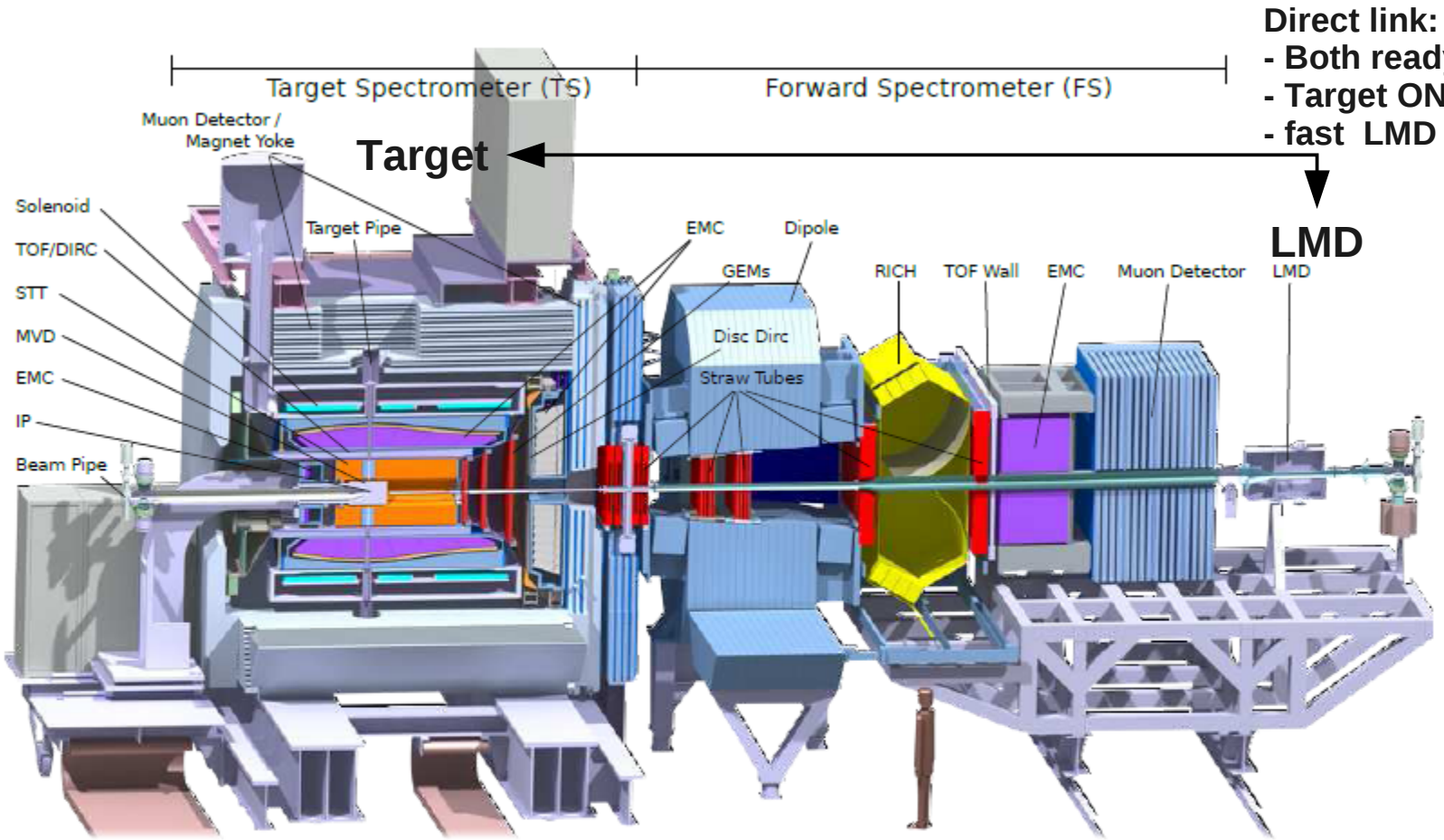
Well, this is the operation WITH the RESR.
But we won't have the RESR for quite a long time.

HESR cycles without RESR



t_exp = 26 min – 65 min ; t_prep = 19 min – 22 min

The Luminosity Detector and PANDA@HESR



Direct link:
- Both ready for physics?
- Target ON/OFF
- fast LMD rate feed back

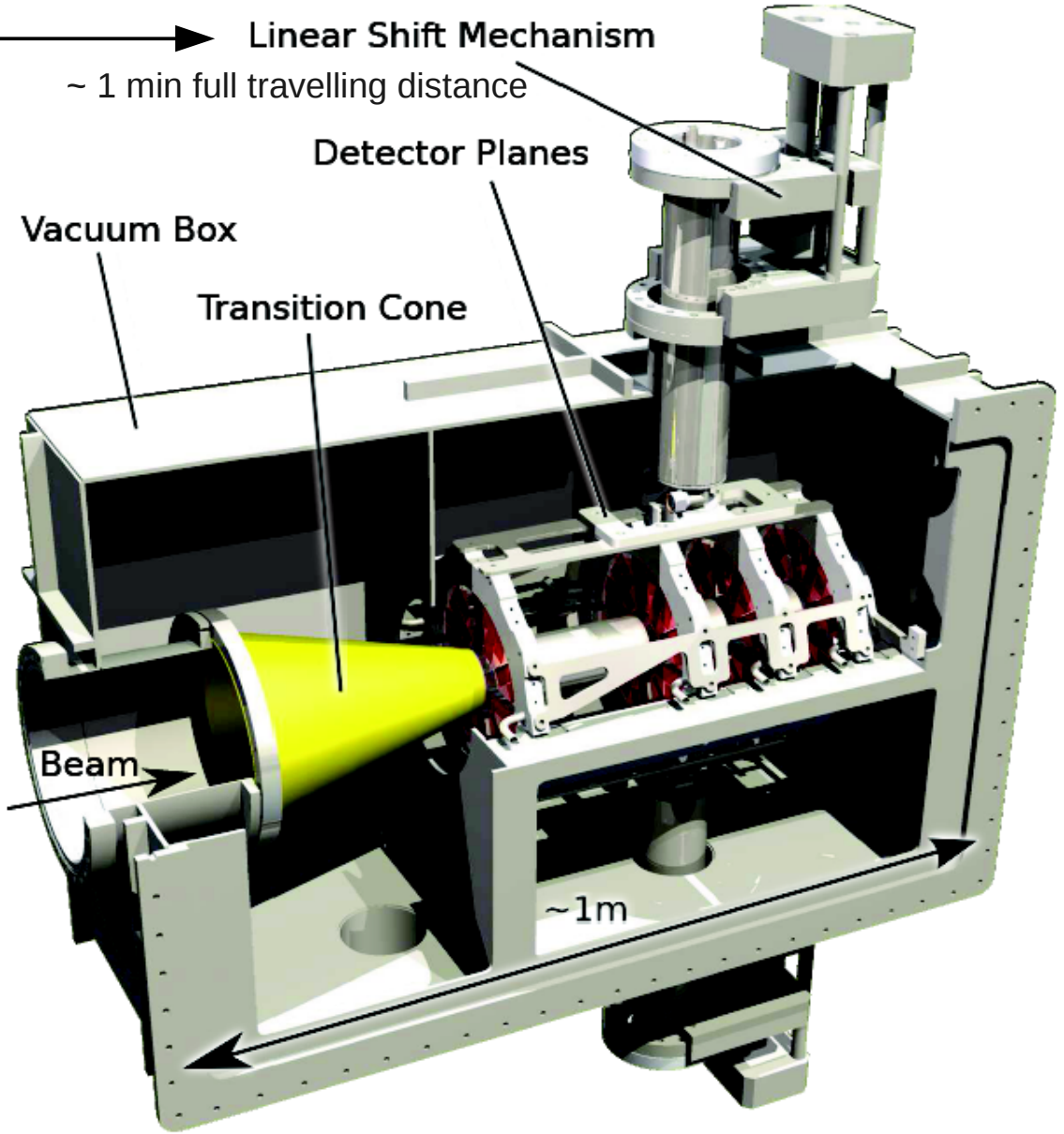
Below 3.8 GeV/c Solenoid field must be reduced down to 1T for 1.5 GeV/c
Dipole field is ramped by HESR according to the beam momentum

→ **Offline access to the dipole field strength at ANY physics data taking time required!**

→ **PANDA Hall probe → DCS?**

The Luminosity Detector

HESR
Beam quality



LMD Sensors

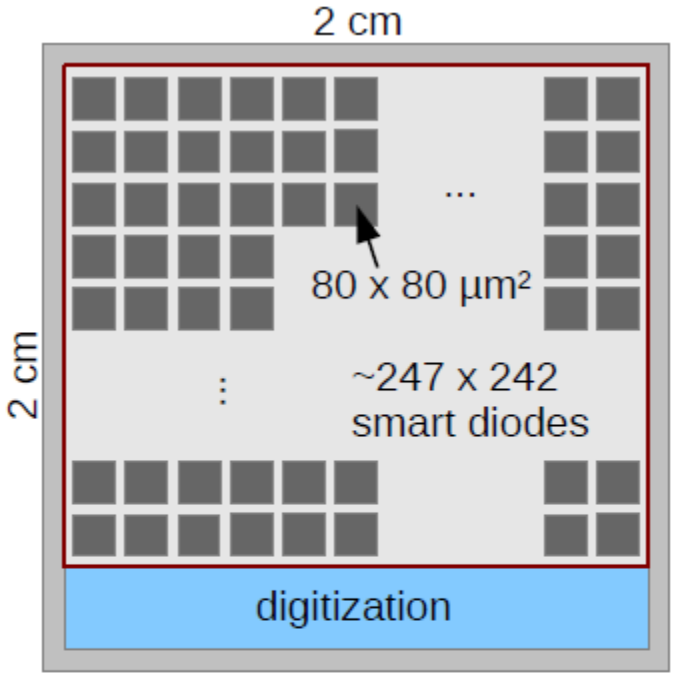


Figure 3.4: Simplified layout of the final HV-MAPS design (Not to scale)

type	pads	traces on module flex cable	description
data	6	4	data output (LVDS @ 800 Mbps)
clock	2	2	system clock (LVDS @ 40 MHz)
SPI	4	4	Slow control
ground	10	6	GND
low voltage (LV)	5	1	high current 1.8 V
LV sense	1	1	sense line low voltage
VSSA	1	1	analog voltage 1.5 V
HV	2	2	60 V
Temperatur	2	2	NTC on chip
Fast reset	2	2	synchronized reset (LVDS)
Test pulse	2	2	test pulse
Reset	2	2	asynchronous reset
Monitor	2	2	discriminator output
Total	41	31	

Table 3.1: Overview of number and usage of PADs on the HV-MAPS.

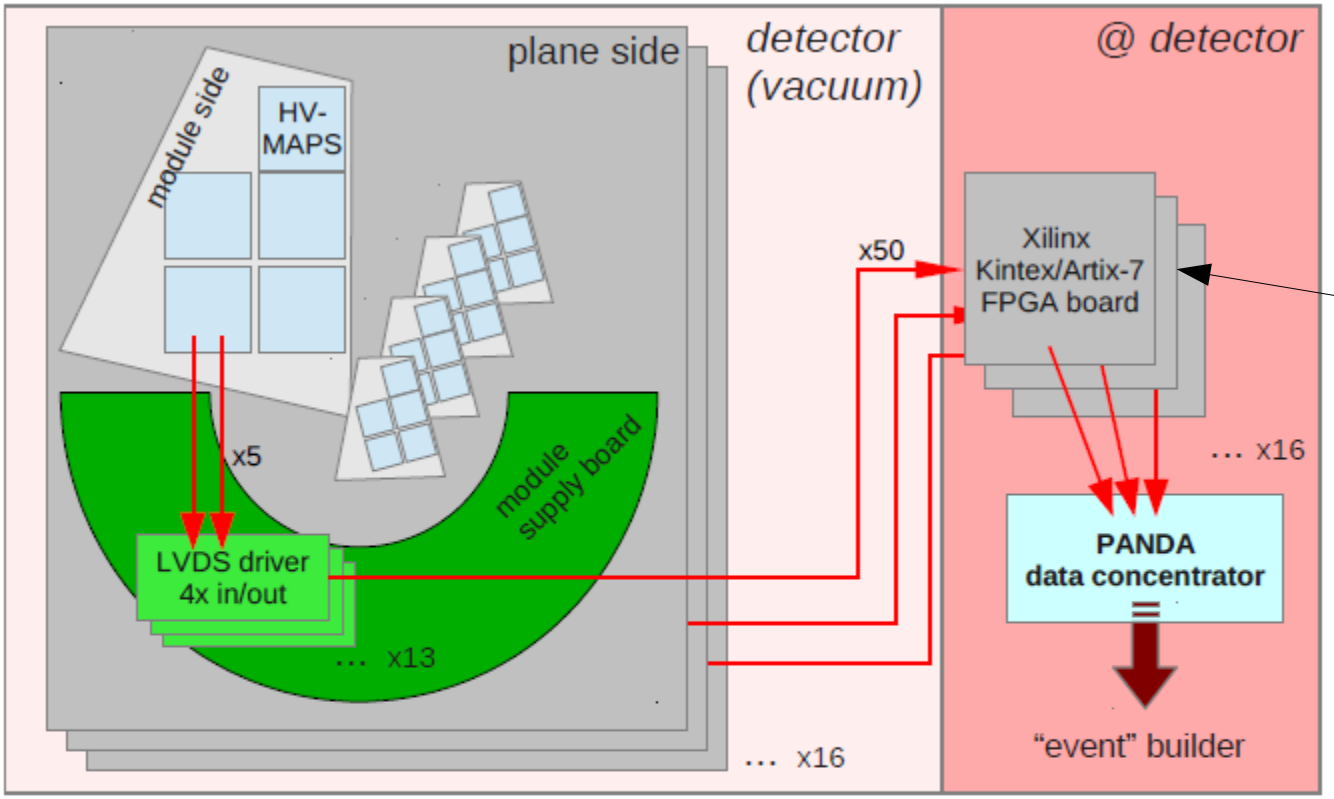
In total 400 HV-MAPS in the LMD
Send time information of hits encoded with a gray counter at 40MHz (25ns)

DAQ of HV-MAPS

HESR burst number or revolution signal?

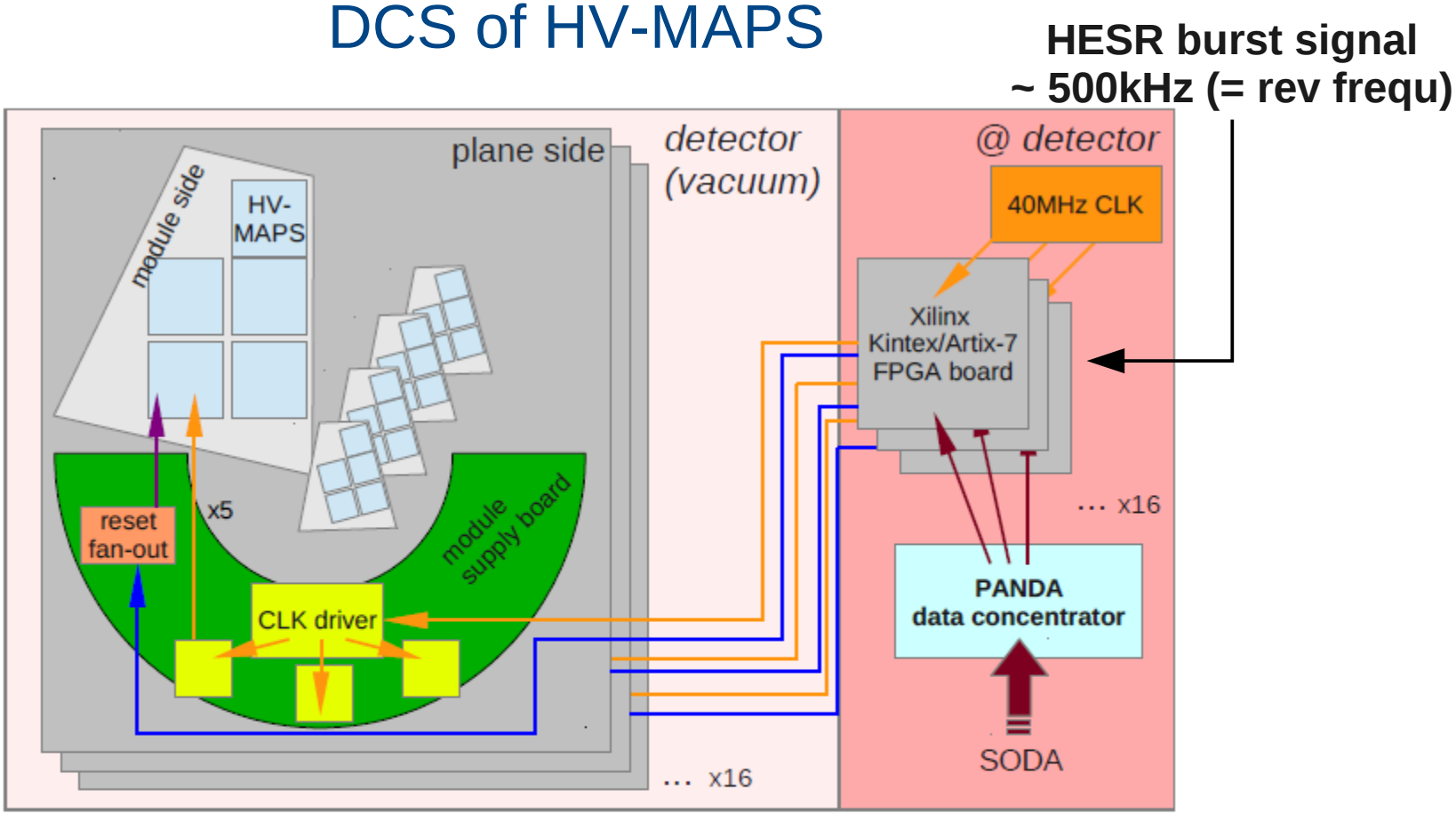
SODA
Clk generator

SODA
Distribution system



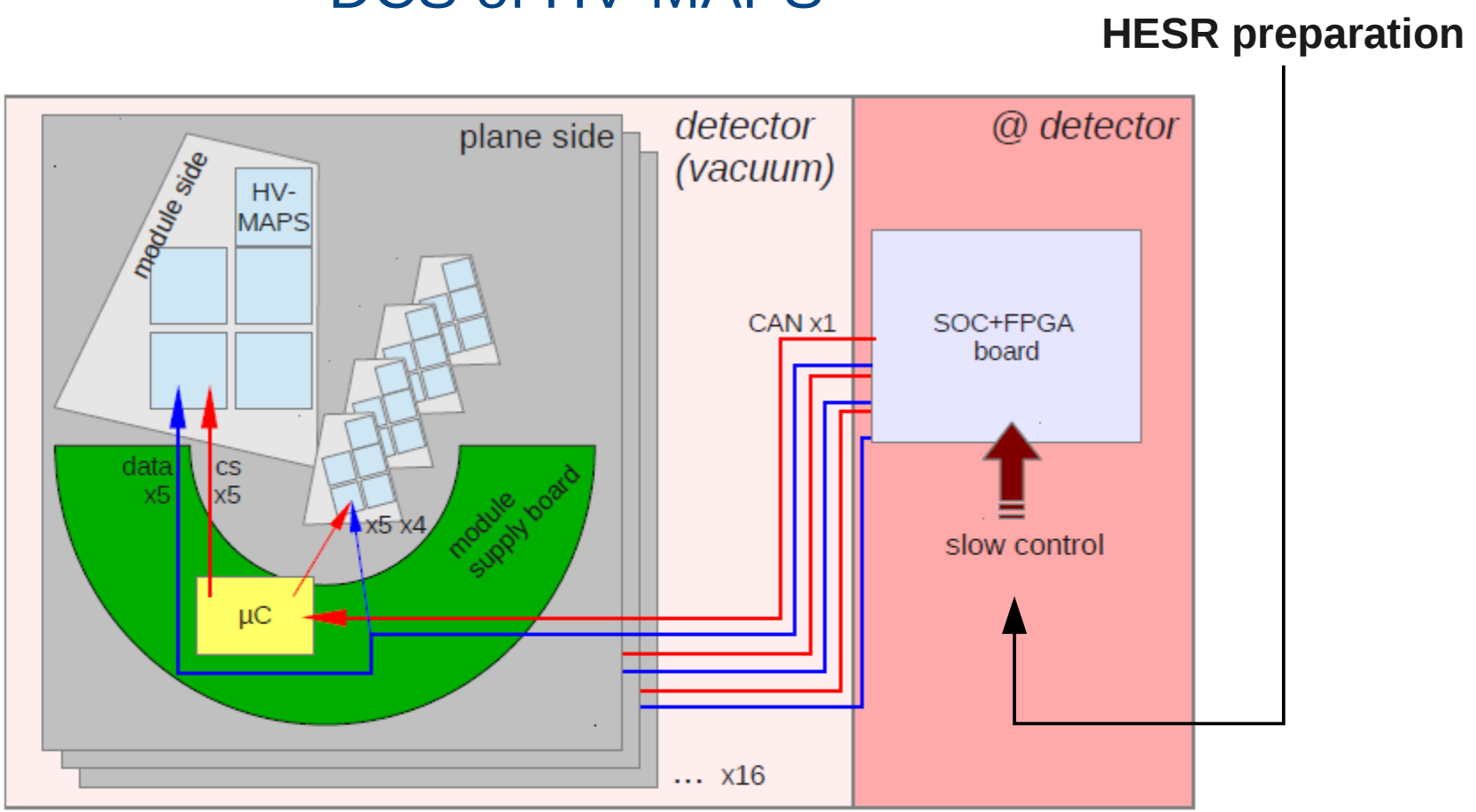
Delay between LMD hits → FPGA board ~ 1µs
Delay between HESR signal → FPGA board = ?
→ **Specifications needed here!**

DCS of HV-MAPS



40 MHz clk signal (most probably) directly coupled to SODA 160MHz clk
Synchronous Reset of gray counters on the HV-MAPS:
Fast resets within one ~ 400 ns long burst gap!
→ **Direct link to HESR monitoring equipment**
with low jitter and well known timing specifications needed!
(analogue signal of beam current pickup?)

DCS of HV-MAPS



~ **15 MB** of sensor settings via SOC+FPGA board
configuration during preparation time in an HESR cycle
In the worst case **only 2 min** available for configuration
and we are not the only ones in PANDA!
→ **HESR information of middle priority**

Prior to Specifications / DB design : Requirements

See the table...