Interface Electronics

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DESY-FEB

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HELMHOLTZ ASSOCIATION

DESY

Outline

> Brief status and news

> Firmware/FPGA ….. Q. Xia, I Sheviakov

General Status

Analogue mother board:

- 3 in hand with old gain
- 7 in hand with up-to-date gain
- 10 in production, ready in April

Analogue daughter

- 10 in hand
- 3 in production
- (7 more empty PCB's)

2 slot backplanes

12 in hand (basic tests)

8 slot backplane

2 in hand and
3 none populated boards.

Control boards

busses

- **Micro controller:** Circuit diagram is done
  - 2x SPI-bus to FPGA control board
  - I^2C branches to interface modules, vacuum-boards, FPGA control
  - Ethernet to external control system
  - SD-card, RS232, JTAG for internal debug

Vybrid with ARM cortex A5/M4 as SOM (system on module)

functions

- 8 isolated voltage supplies 5V/100mA for the 8 Vacuum boards
- 12 fans with each 300mA/-12V
  can be put in parallel for fewer stronger fans.
  I-settable, turn and U monitored
- Internal U, I, T, humidity monitored

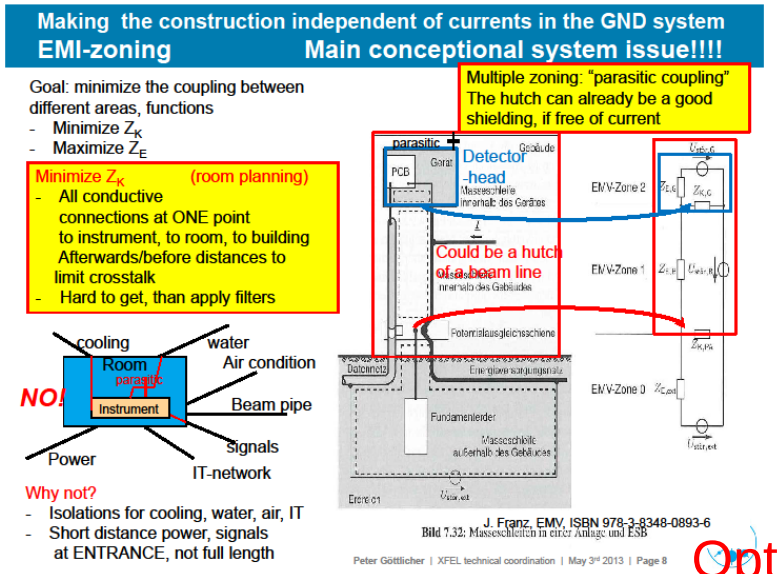
layout

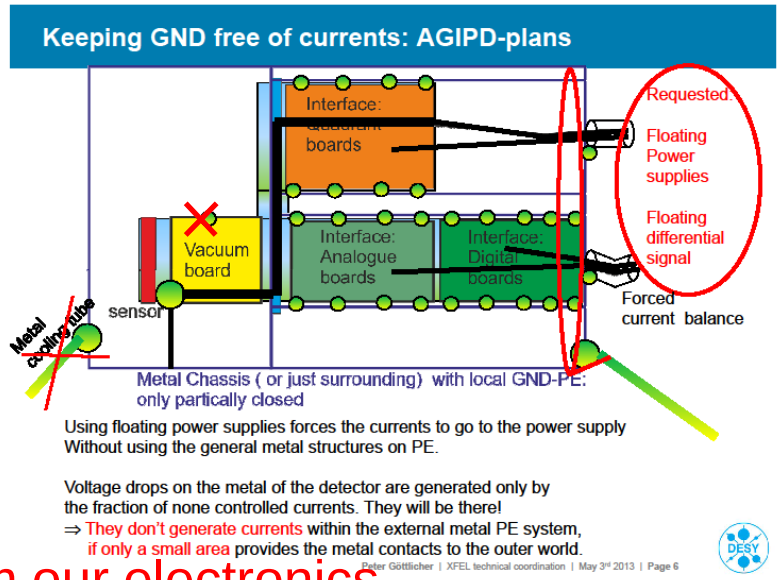
- mechanical options to put connectors straight or parallel to digital boards. Prices mech.design and wires

Fallback option: Few Fan-power to a parallel board to digital part

Additional options NOW!!!!!!!!!!!!

News to grounding in hutches





The concept for industrial side planning is unlikely to be used for the XFEL-hutch planning:
"It is task of experiment to get itself independent"

Options from our electronics

- Guided return currents with limited flow in PE-system
- Local current returns of parasitic currents to PE with option to open.
- Differential signaling
- But everything is limited and not perfect

=> Doing now a mechanical/electrical concept to have low impact from and to others is realistic, later changes even for studies are major efforts.

Handling over to FPGA/Firmware

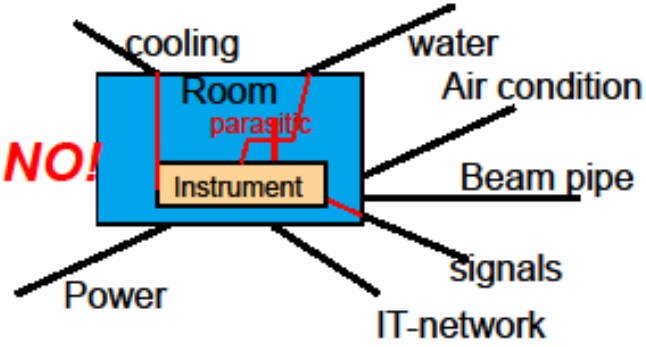
Item on Agenda is

Firmware for ……

Making the construction independent of currents in the GND system
EMI-zoning Main conceptional system issue!!!!

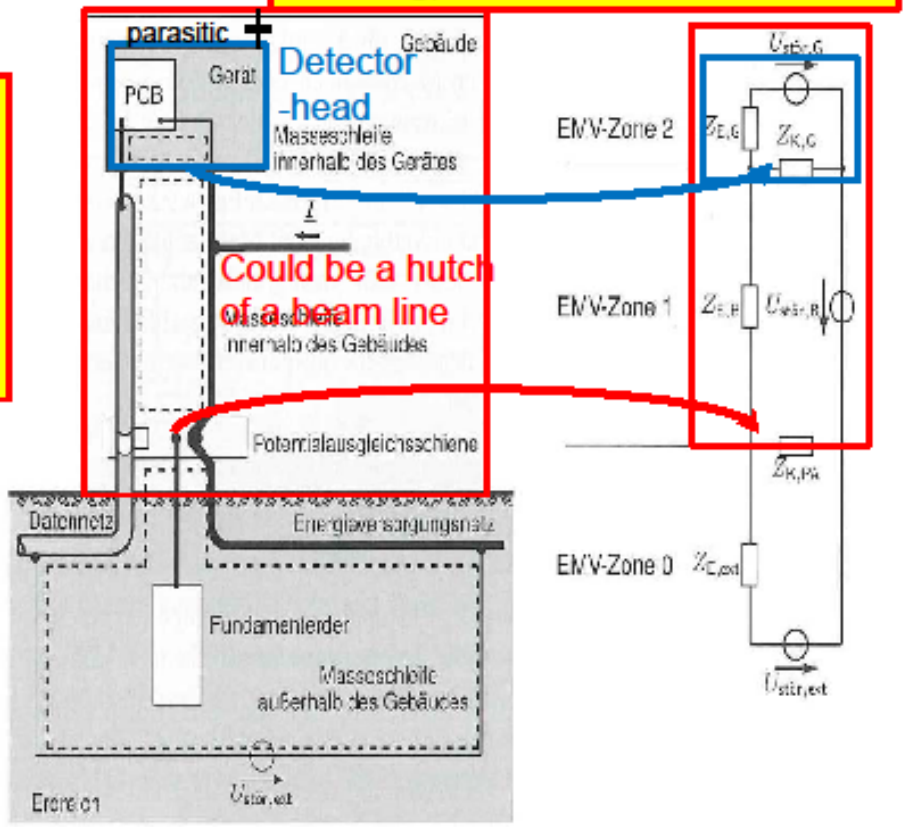
Goal: minimize the coupling between different areas, functions
- Minimize Z_K
- Maximize Z_E

Minimize Z_K (room planning)
- All conductive connections at ONE point to instrument, to room, to building
  Afterwards/before distances to limit crosstalk
- Hard to get, than apply filters



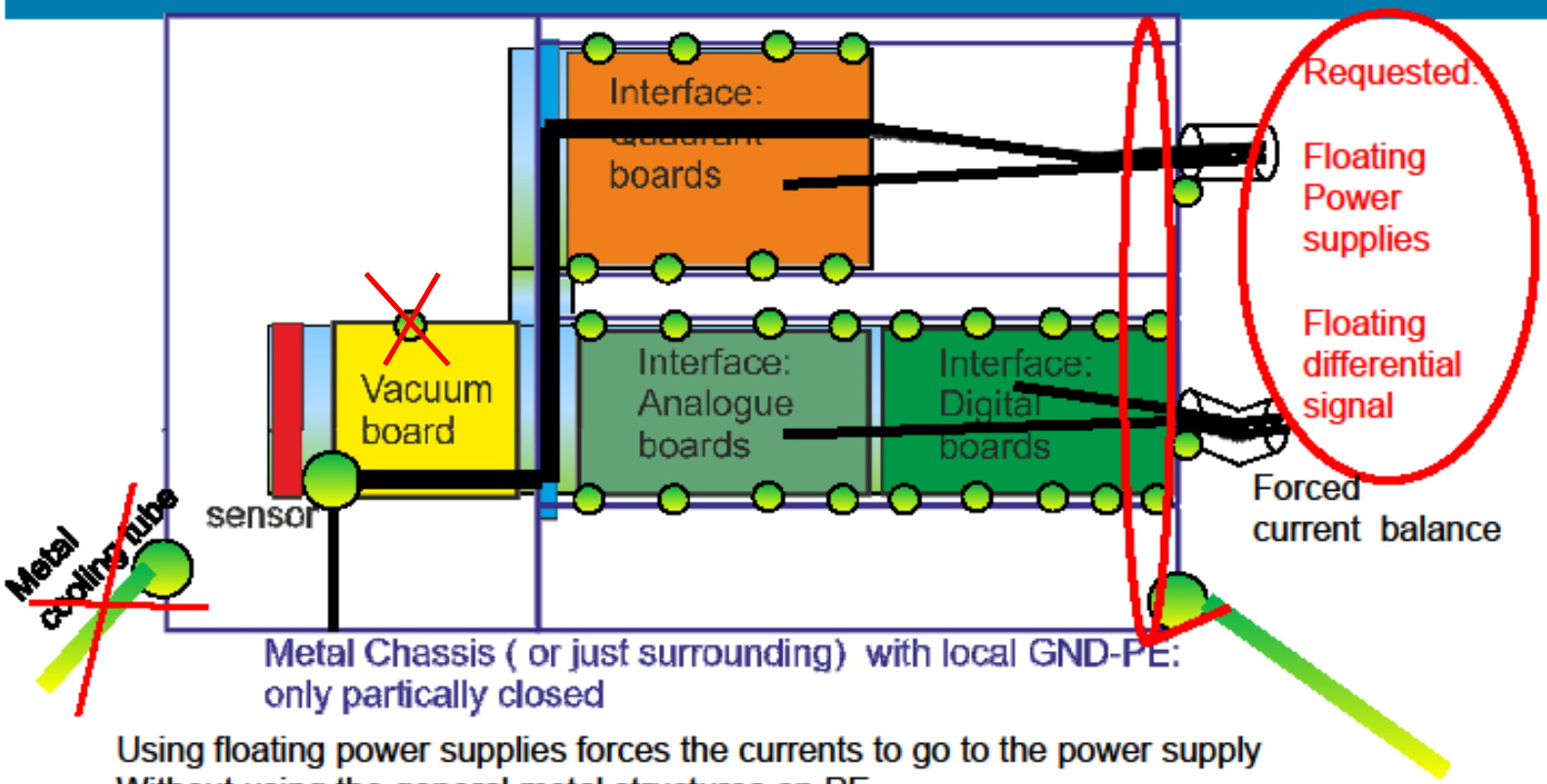
Why not?
- Isolations for cooling, water, air, IT
- Short distance power, signals at ENTRANCE, not full length

Multiple zoning: "parasitic coupling"
The hutch can already be a good shielding, if free of current



J. Franz, EMV, ISBN 978-3-8348-0893-6
Bild 7.32: Masseschleifen in einer Anlage und ESB

Keeping GND free of currents: AGIPD-plans



Using floating power supplies forces the currents to go to the power supply
Without using the general metal structures on PE.

Voltage drops on the metal of the detector are generated only by
the fraction of none controlled currents. They will be there!
⇒ They don't generate currents within the external metal PE system,
if only a small area provides the metal contacts to the outer world.