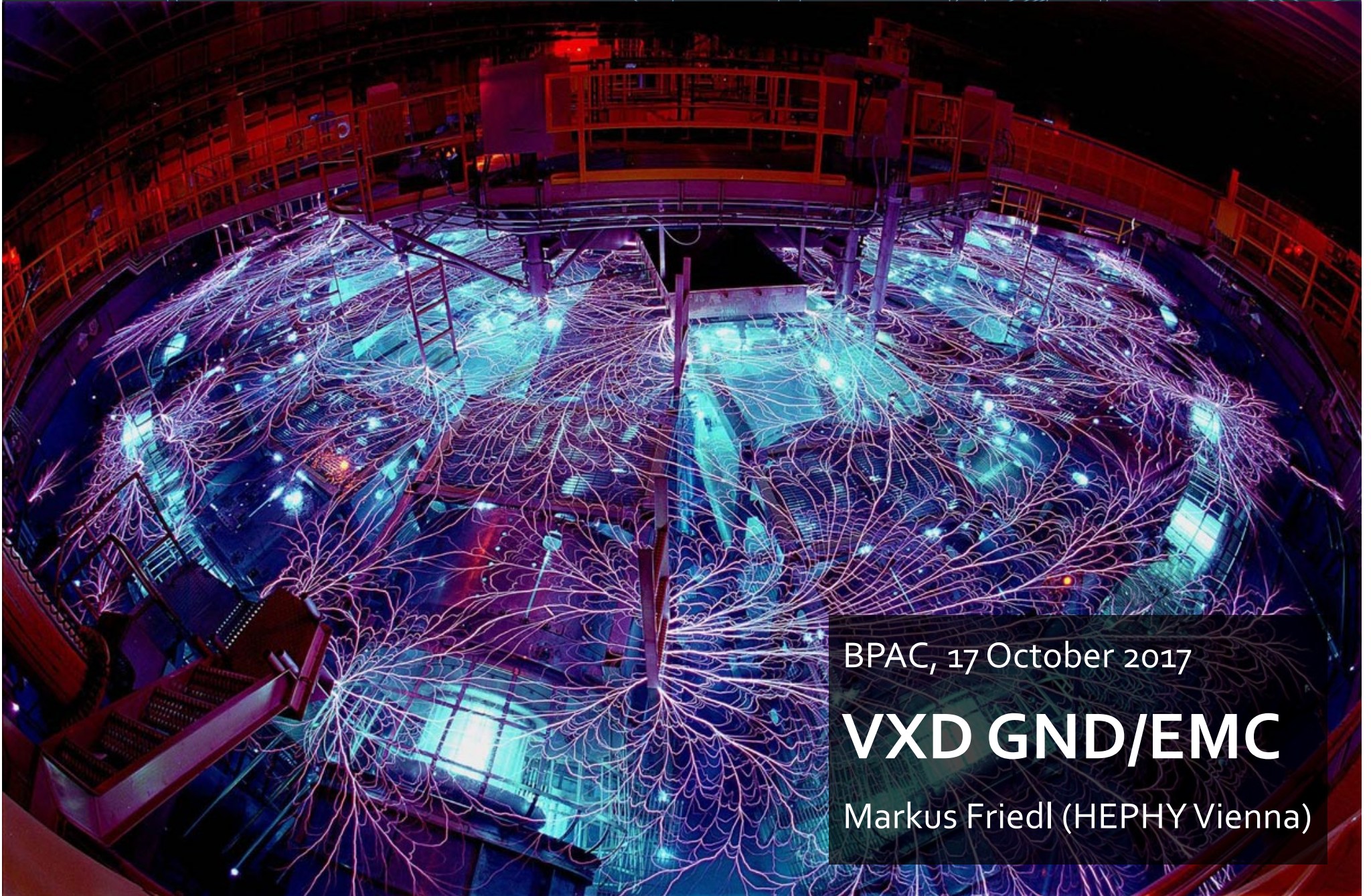SVD PXD

BPAC, 17 October 2017

VXD GND/EMC

Markus Friedl (HEPHY Vienna)

Disclaimer

- In fact, I do not have anything **new** to present

- There was a final meeting of the Belle II GND/EMC group on 8 February 2017

Introduction

- GND/EMC concepts of SVD and PXD
  - Developed with Fernando Arteche (ITA Zaragoza, Spain)
  - And in consultation with the Belle II grounding group
  - Established since 2015

- EMC measurements were performed for both SVD (2015) and PXD (2016) in the anechoic chamber @ ITA
  - Improvements implemented after that for SVD
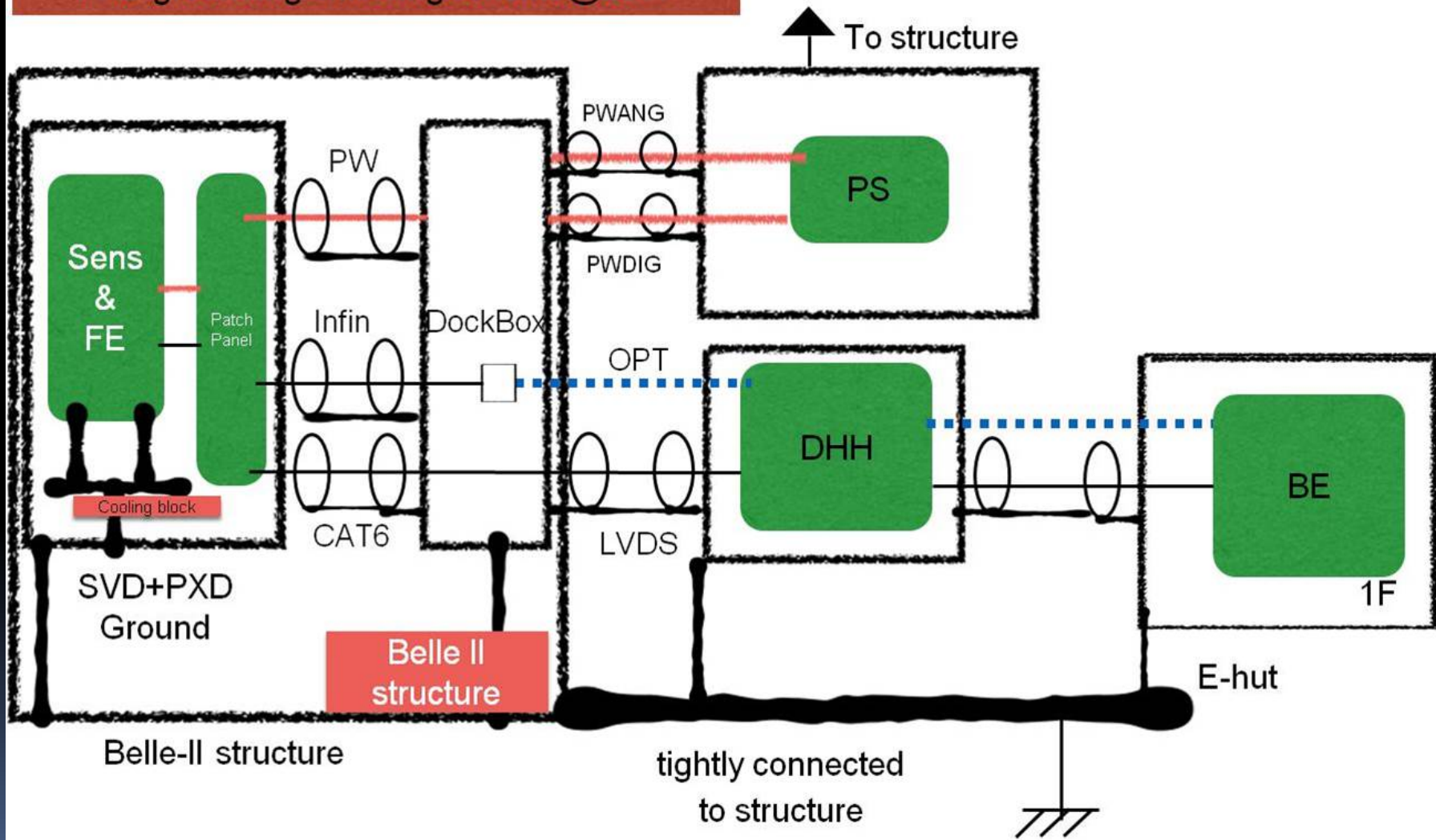 - PXD was found to work well

General Guidelines

- All metallic pieces are to be grounded (not floating)

- VXD volume is electrically isolated from CDC and beam pipe
  - Cooling pipes are also separated by special isolators
  - Likewise, SVD DOCK boxes are isolated from CDC and grounded to end flanges of VXD
  - PXD is isolated from beam pipe

- BWD end flange is connected to solid Belle II structure
  - BWD and FWD sides are connected through metallized CF shell (SVD) or cooling tubes (PXD)
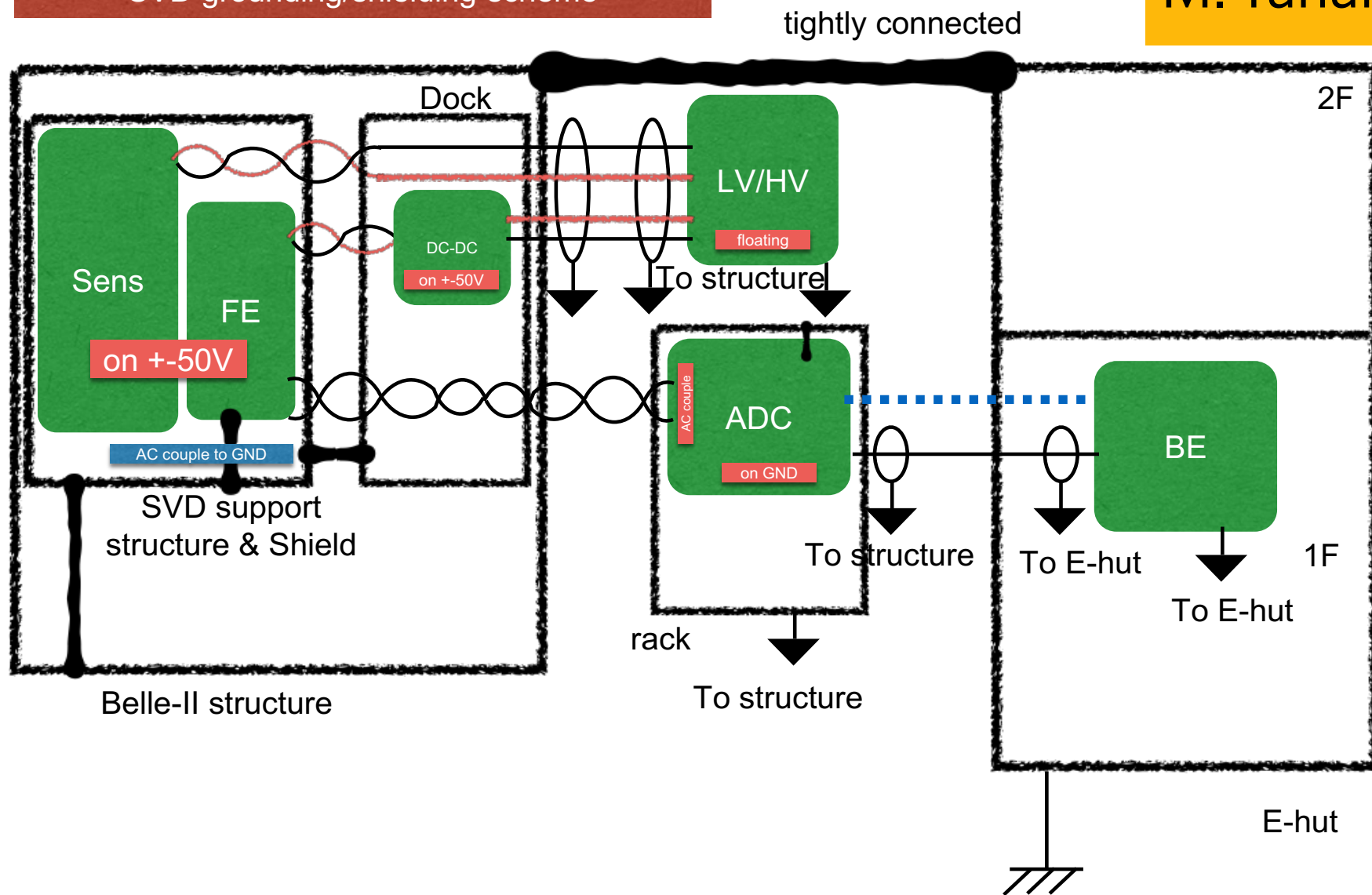 - BWD and FWD end flanges/end rings become local ground points
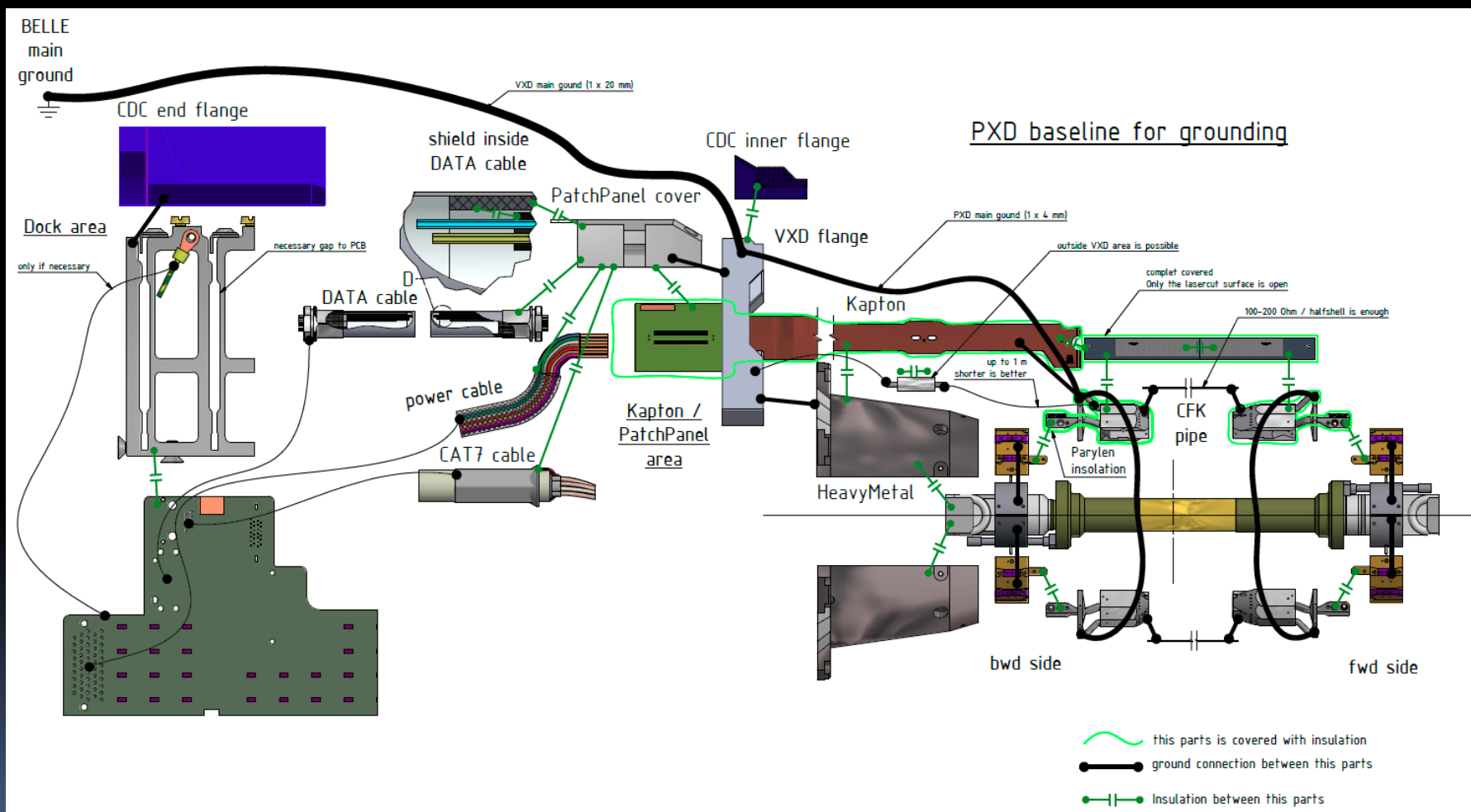
M. Tanaka

PXD grounding/shielding scheme@2017

SVD grounding/shielding scheme

tightly connected
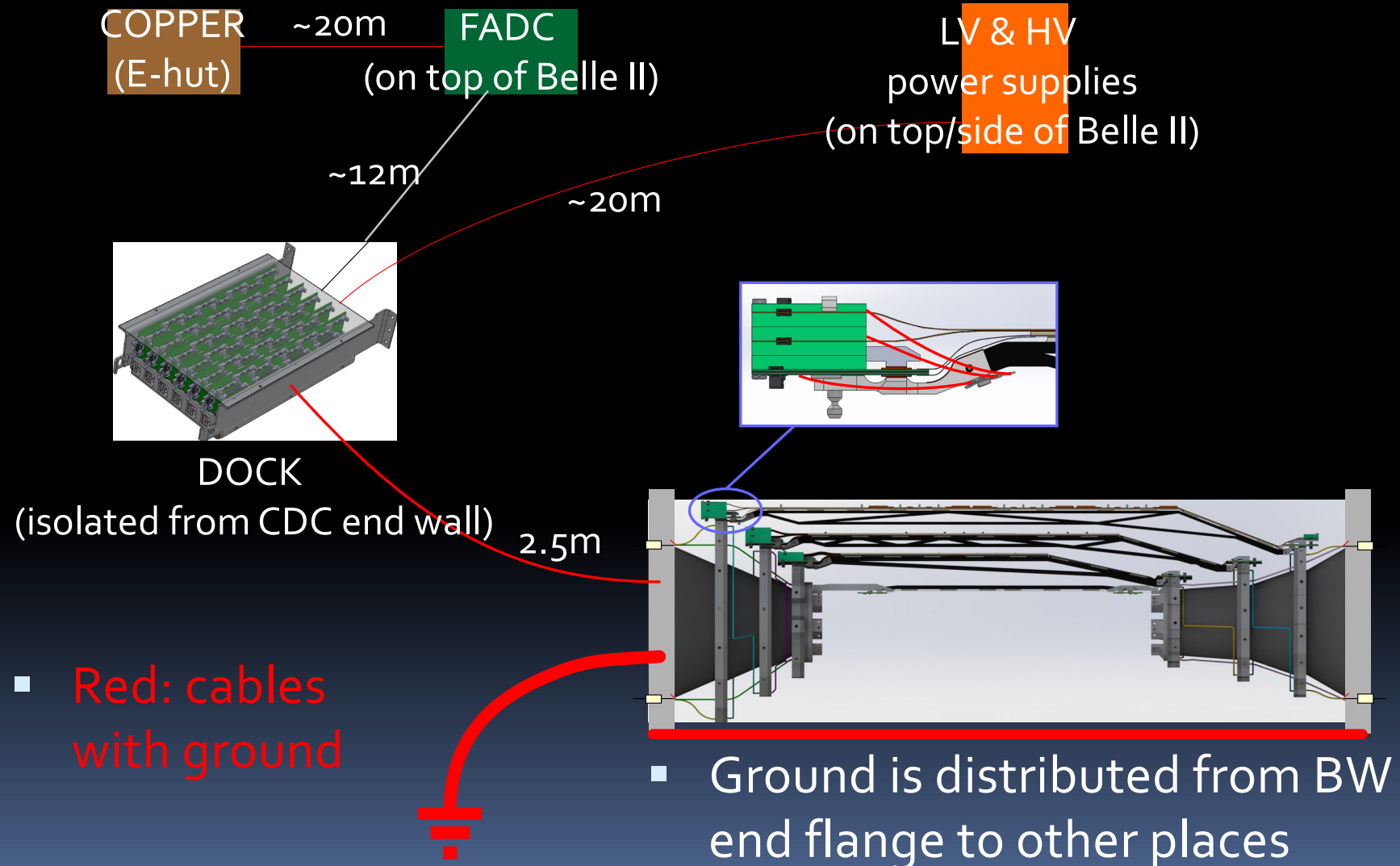
Dock

2F

LV/HV

floating

DC-DC

on +-50V

To structure

Sens

FE

on +-50V

AC couple to GND

AC couple

ADC

on GND

BE

SVD support
structure & Shield

To structure

To E-hut

1F

rack

To structure

To E-hut

Belle-II structure

E-hut

PXD Drawing

SVD Drawing

COPPER (E-hut) ~20m FADC (on top of Belle II)

LV & HV power supplies (on top/side of Belle II)

~12m

~20m

DOCK (isolated from CDC end wall)

2.5m

- Red: cables with ground

- Ground is distributed from BW end flange to other places
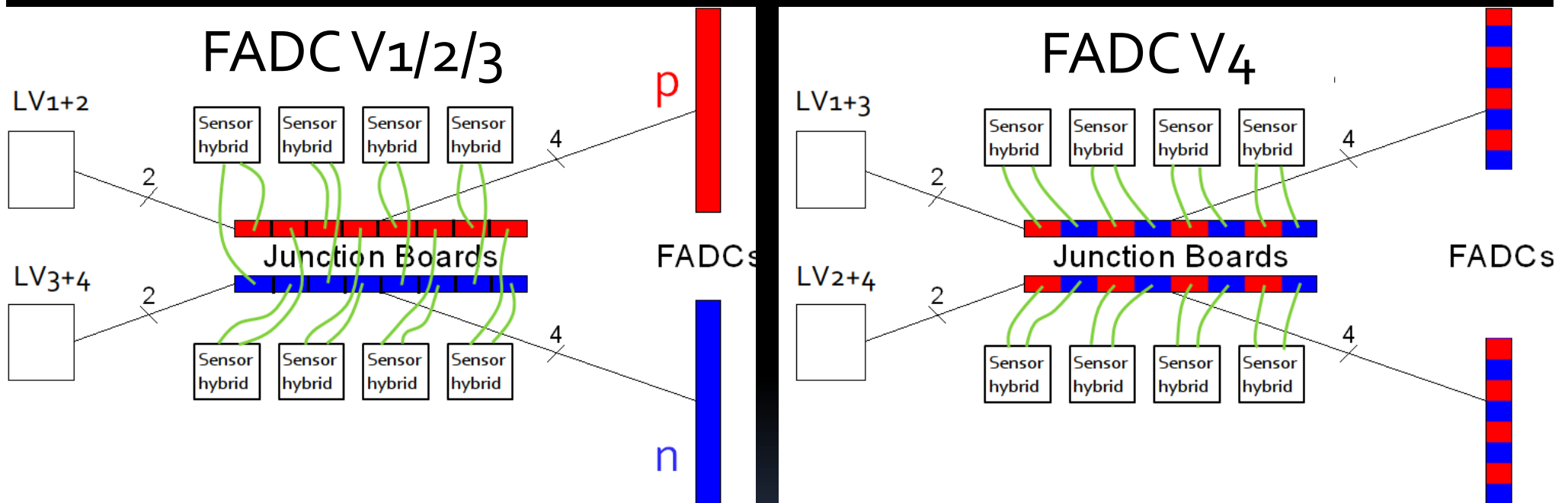
SVD: Mixed p/n Readout in V4

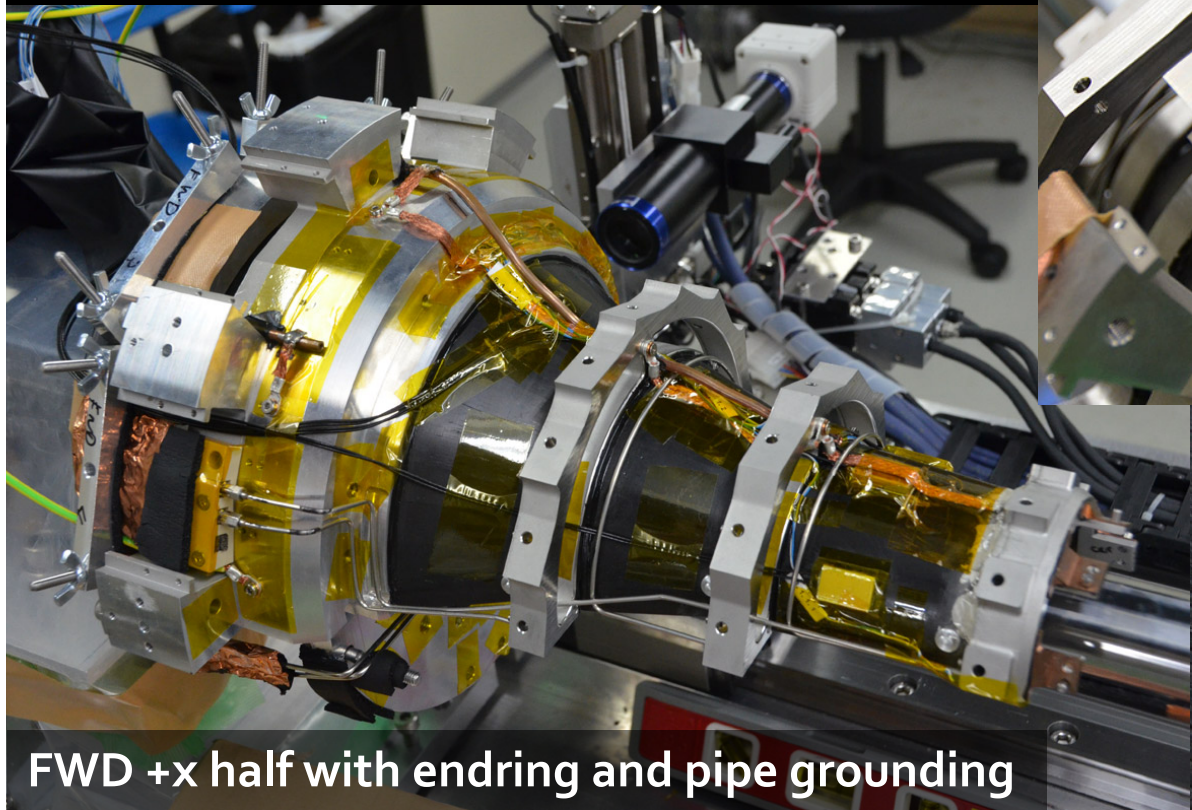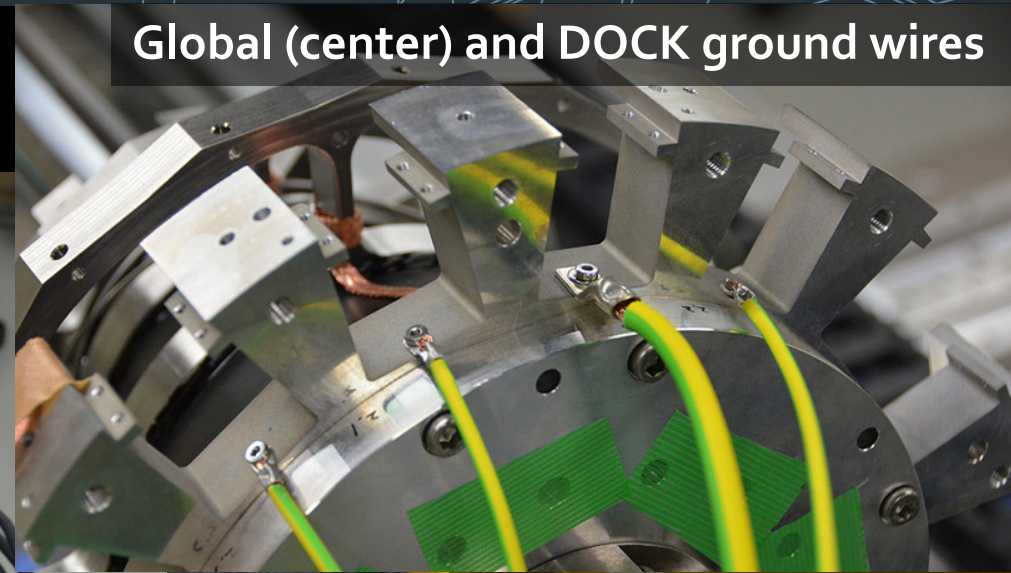- Up to V3: separate boards → potential ground loops

FADC V1/2/3

FADC V4

- V4: alternating p- and n-side readout on the same board
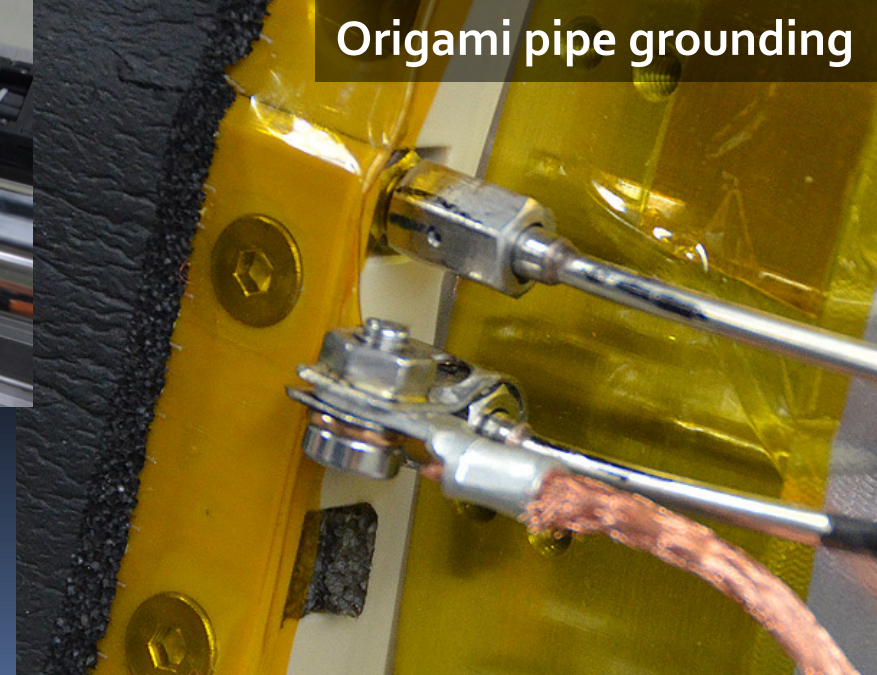 - Performance: see yesterday's talk by Richard Thalmeier

SVD Photos

Global (center) and DOCK ground wires

Origami pipe grounding

FWD +x half with endring and pipe grounding

Ceramic isolators

Summary & Outlook

- Grounding scheme of PXD and SVD developed together Fernando Arteche and GND/EMC group

- Powering scheme with floating supplies and front-end ground reference

- EMC tests @ ITA Zaragoza (2015, 2016)
  - Leading to improvements for SVD

- Phase 2 will be the final test of the grounding scheme (implemented in the same way as in phase 3)

"Earthing" or "Grounding"

Direct physical contact of the human body with the surface of the earth

- *reduces blood viscosity*
- *improves cardiovascular health*
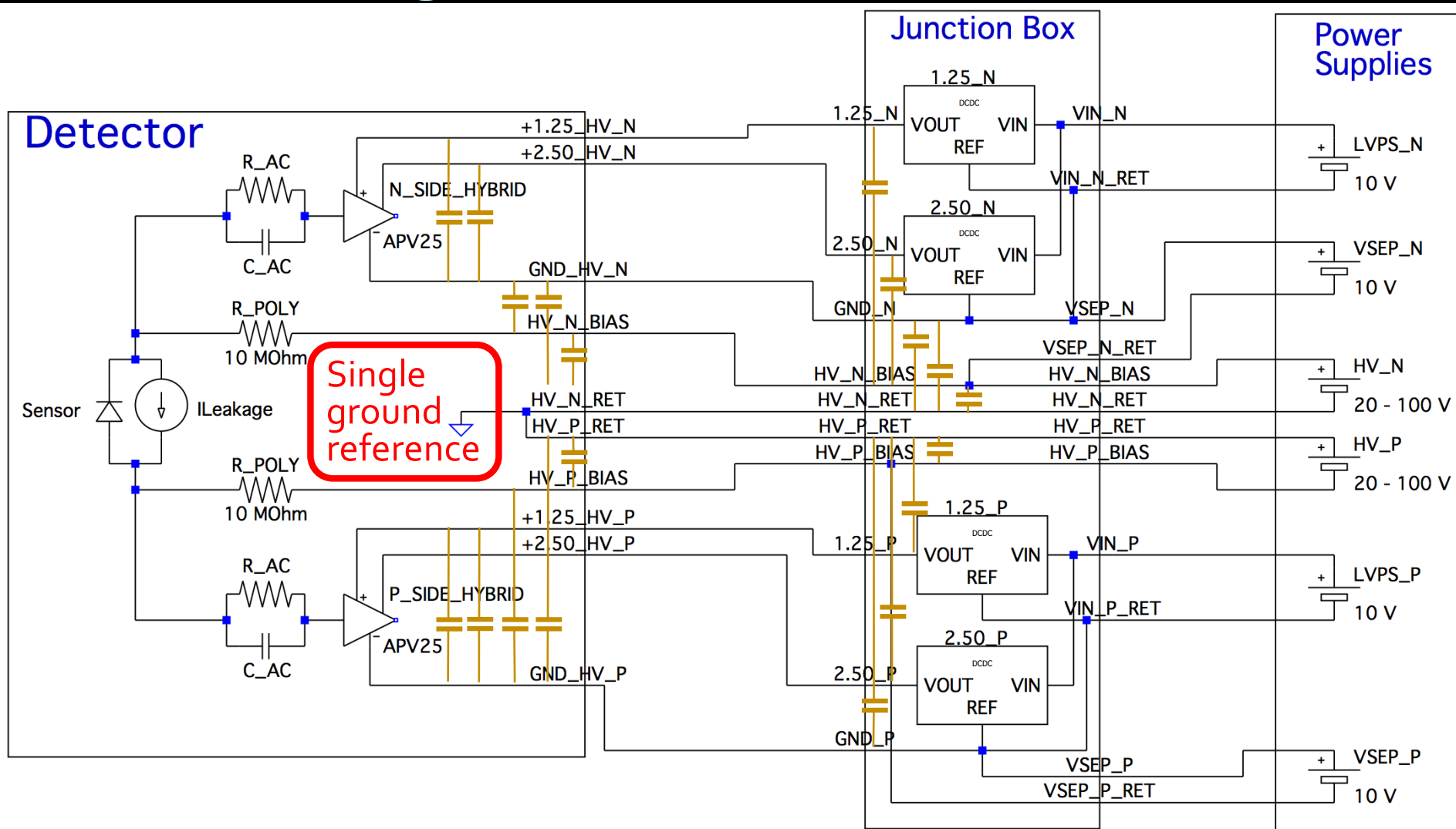- *better sleep*
- *reduces pain*
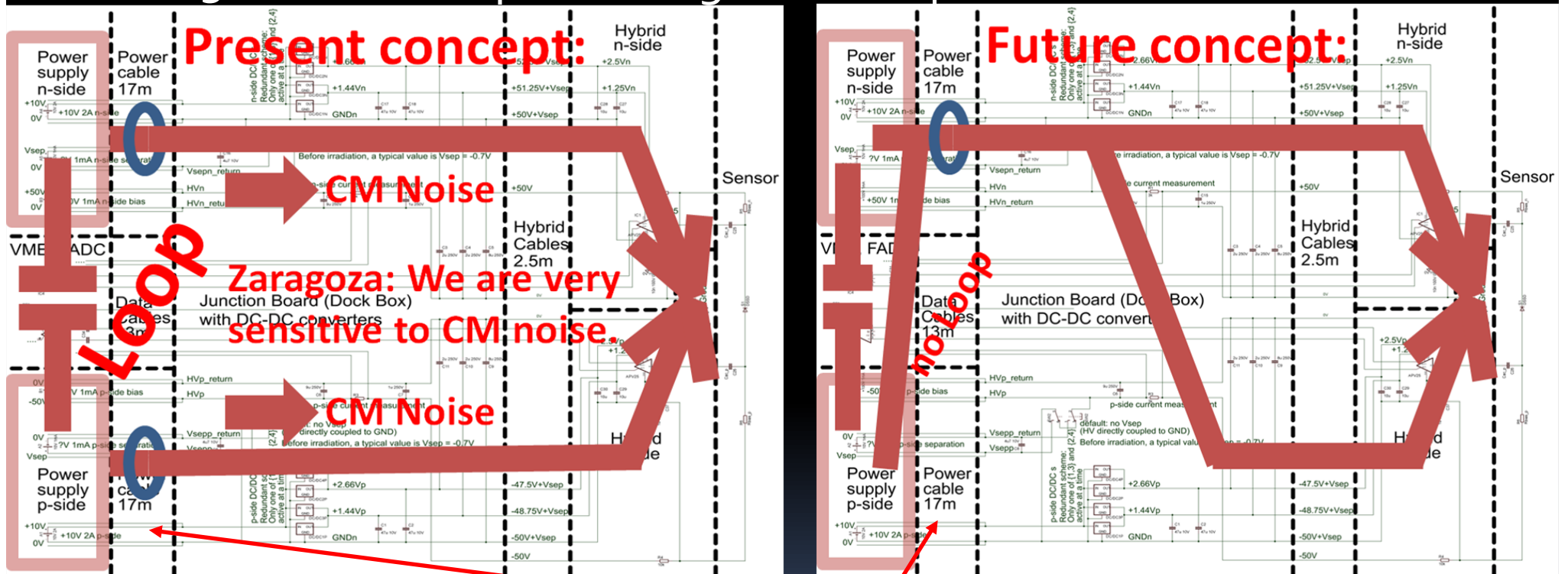- *feeling of well-being*
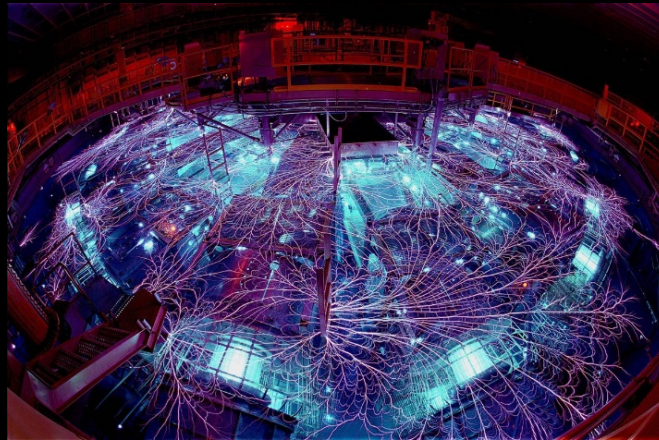
Backup Slides

SVD Powering Scheme

SVD FADC V3/V4

- V3 scheme has potential ground loops → to be avoided

- Longest part of cable (17m) is here