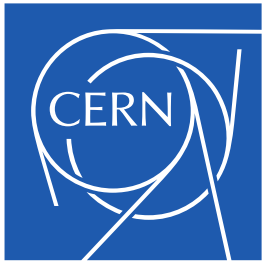
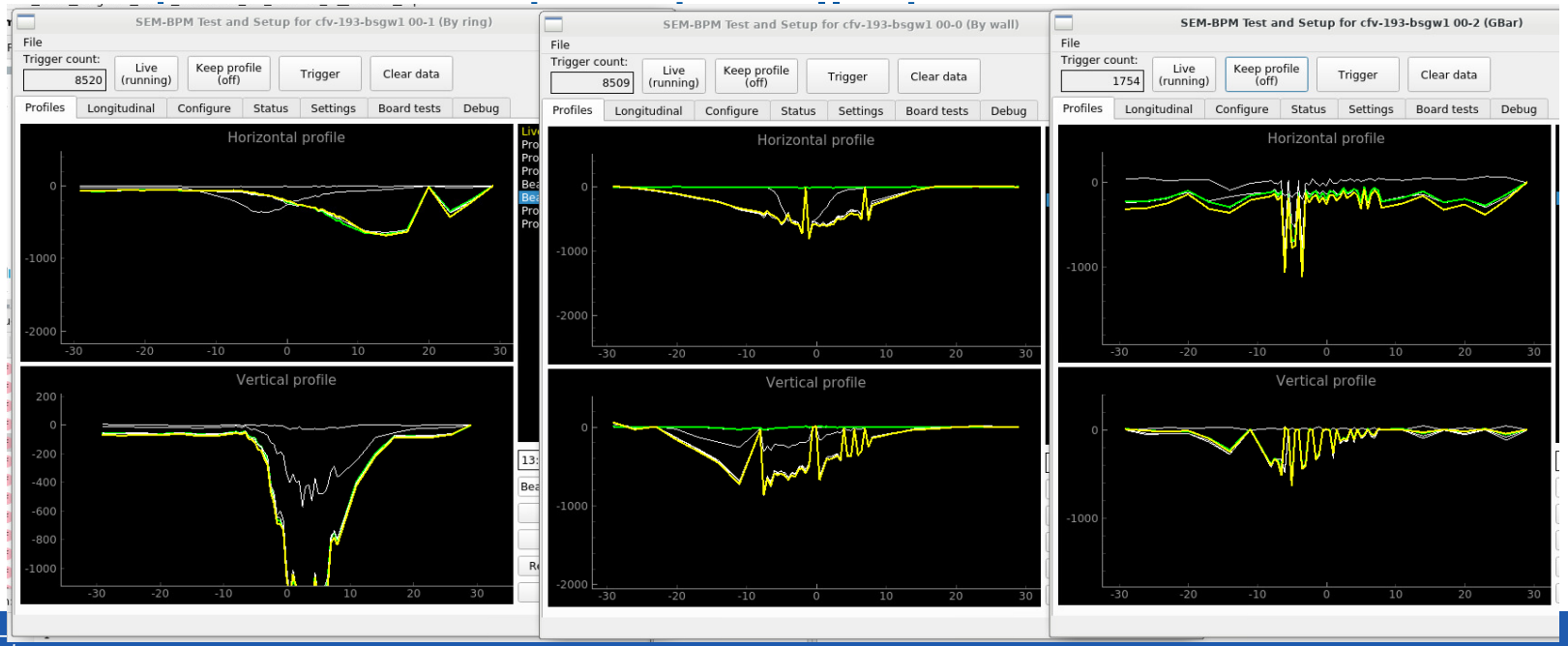


SEM Grid Status
ELENA Extended Commissioning Committee
Mark McLean, 18th Feb 2020

Overview

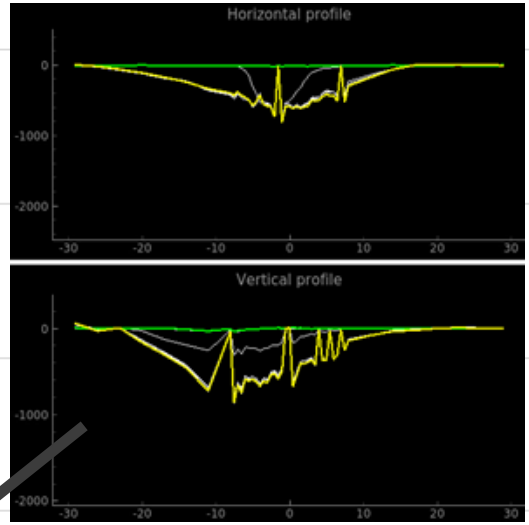
- Beam tests on seven monitors in December 2019



Non responding wires

- During beam tests we found a number of wires that did not respond to beam.
- Also found bad connections between connector pins and the ceramic PCB. This is due to the restricted materials permitted in the UHV, and the high bakeout temperatures.
- A survey of installed grids using Time Domain Reflectometry shows that many of the installed grids have bad connections.
- We hope to be able to repair these with silver glue.

TDR Summary

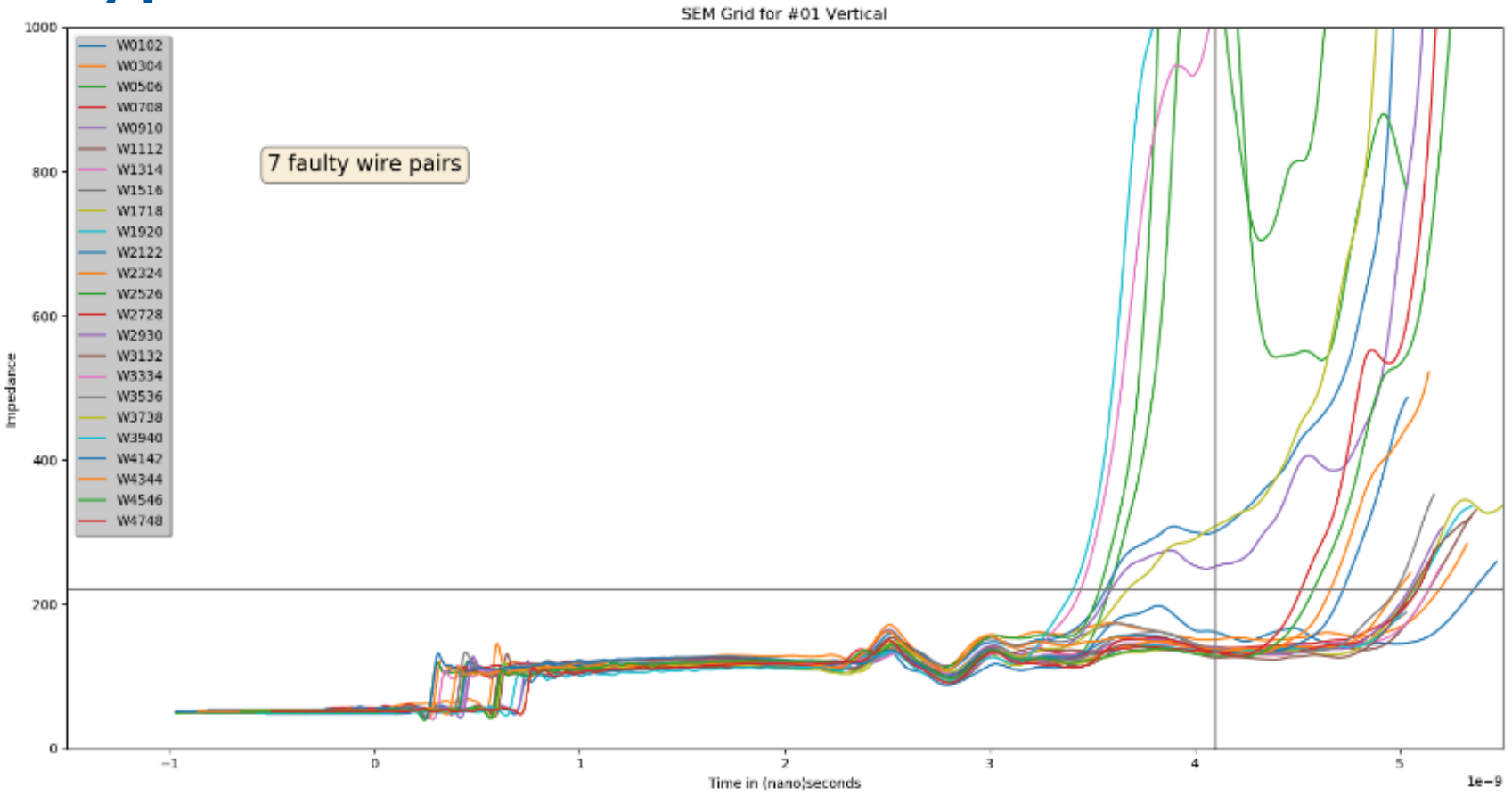

Horizontal profile
Vertical profile

Number of faulty pairs
25
20
15
10
5
0
LNS.BSGWA.0010
LNE.BSGW.0025
LNE.BSGW.0038
LNE.BSGW.0045
LNE50.BSGW.5060
GBAR SEM
LNE01.BSGW.0109
LNE01.BSGW.0120
LNE01.BSGW.0137
LNE03.BSGW.0303
LNE03.BSGW.0315
LNE04.BSGW.0403
LNE04.BSGW.0410
LNE04.BSGW.0422
LNE04.BSGW.0429
LNE07.BSGW.0722
LNE07.BSGW.0737
LNE07.BSGW.0744
Vertical
Horizontal

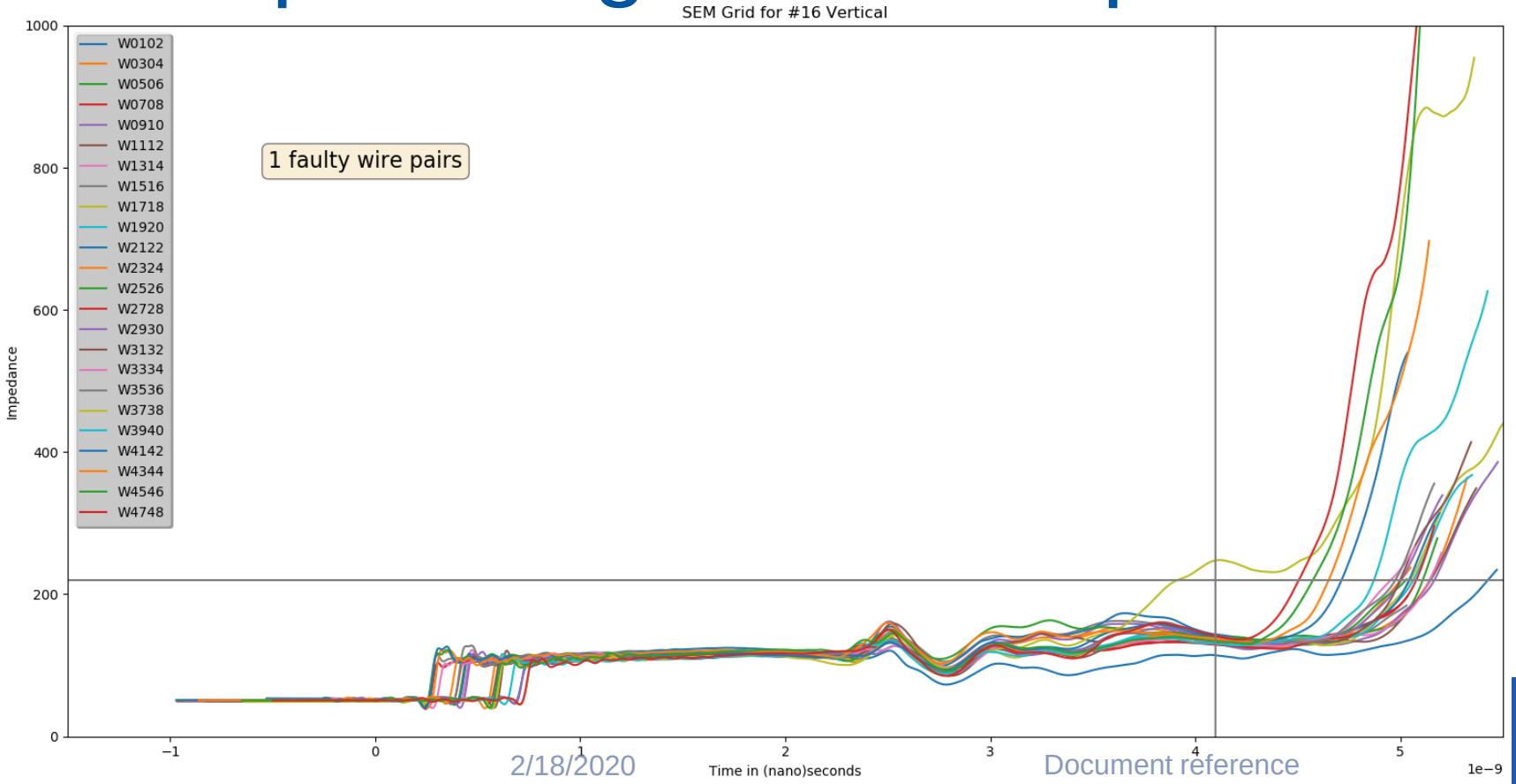
TDR Info

- Connections were tested in pairs. A bad pair might be one connection, or it might be two.
- The technique sends a range of frequencies into the DUT and measures the impedance as a function of time.
- Data was captured in the instrument and subsequently processed to determine good and bad connections.

Typical results



Near perfect grid for comparison



Front-End Boards

- So far there have been two versions of the Front-End Board, V1 produced in 2016 and V2 produced in 2019.
- V2 fixed a few things but had worse inherent noise and worse sensitivity to external noise.
- Following beam and lab tests, we believe we know the reasons for the differences.

Front-End V3 plan

- Design is complete now
- Should be manufactured by mid-April, 6 boards at CERN and 6 in Japan
- Bench tests in late April
- If results look good will order the bare circuit boards and components for ~100 units
- Beam test in May – depends on beam availability
- Order the assembly of the ~100 units
- Install on transfer lines end June

Availability of grids

- Three units have recently failed vacuum tests
- Assuming these can be repaired, we are still short of 11 units.
- Five are on their way from Japan, five more are promised “soon”.
- Hope to be able to repair bad connections with silver glue
- Need to plan and prioritise
- Discussions ongoing to make at CERN, but will take time.

Triggering

SEM Grid Triggering