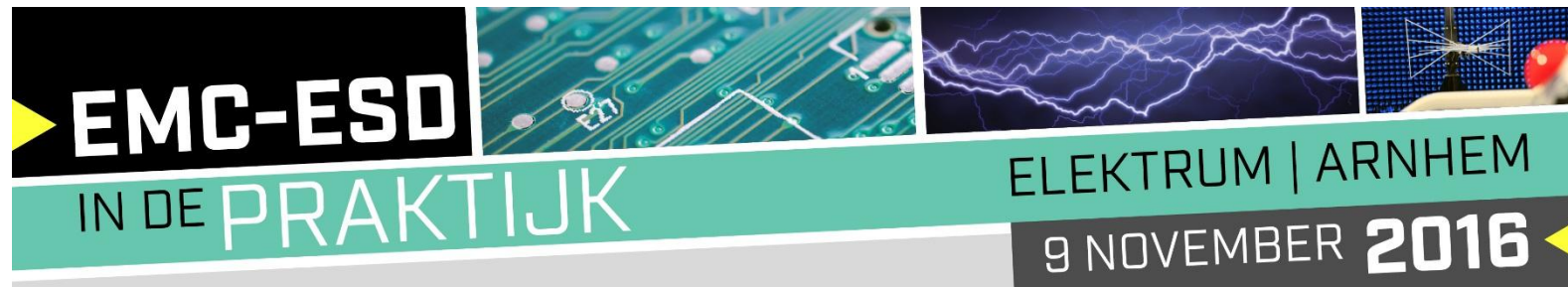


Problems that can arise in a working EMC laboratory

Dave Cullen, Test Instrumentation Manager, York EMC Services Ltd

on behalf of

AR Benelux B.V.



What has gone wrong?

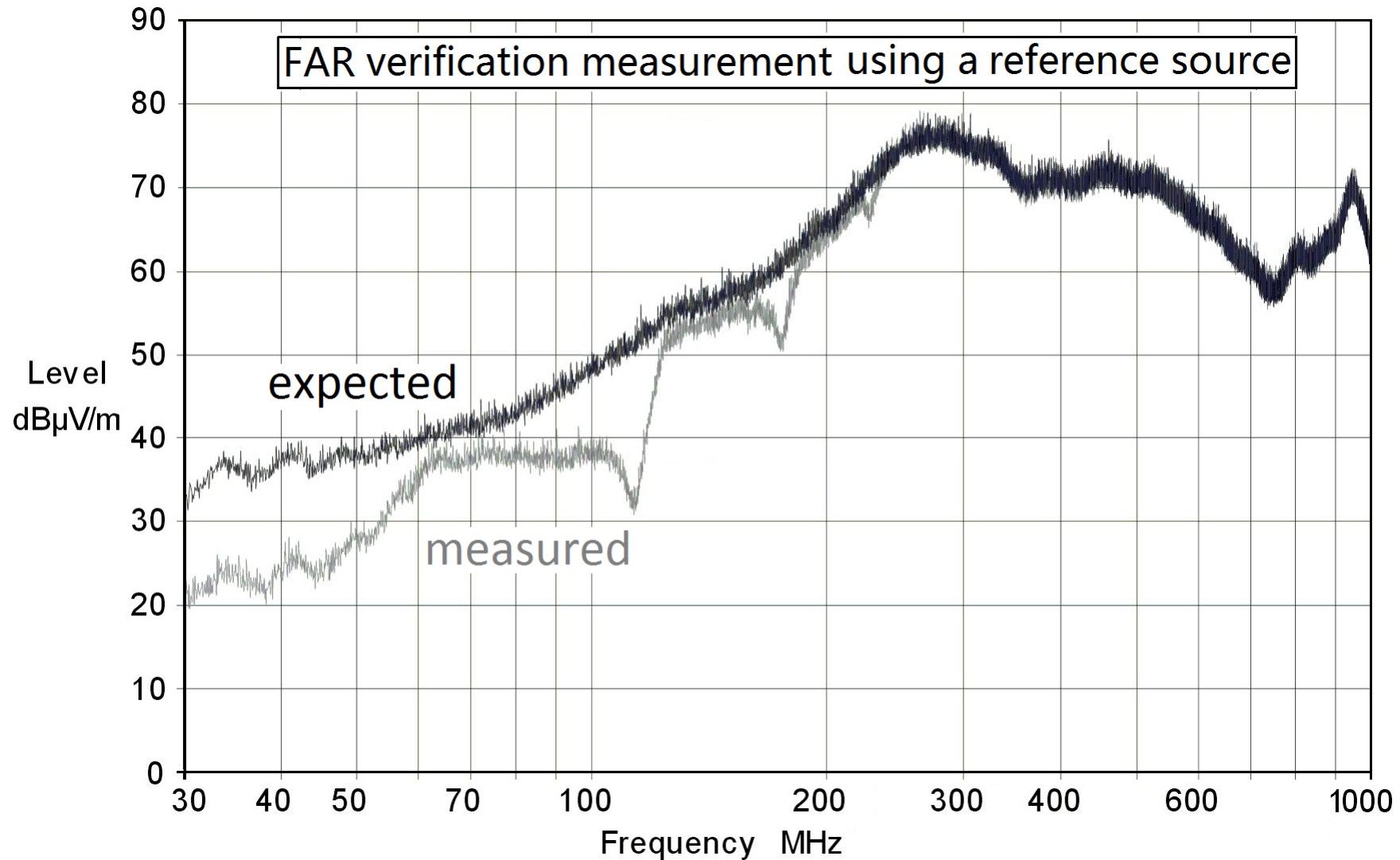
- Equipment failure
- Problem with the test set-up
- Operator error
- Equipment out of calibration
- Nothing

.. but the uncertainty budget or error factors might need rethinking

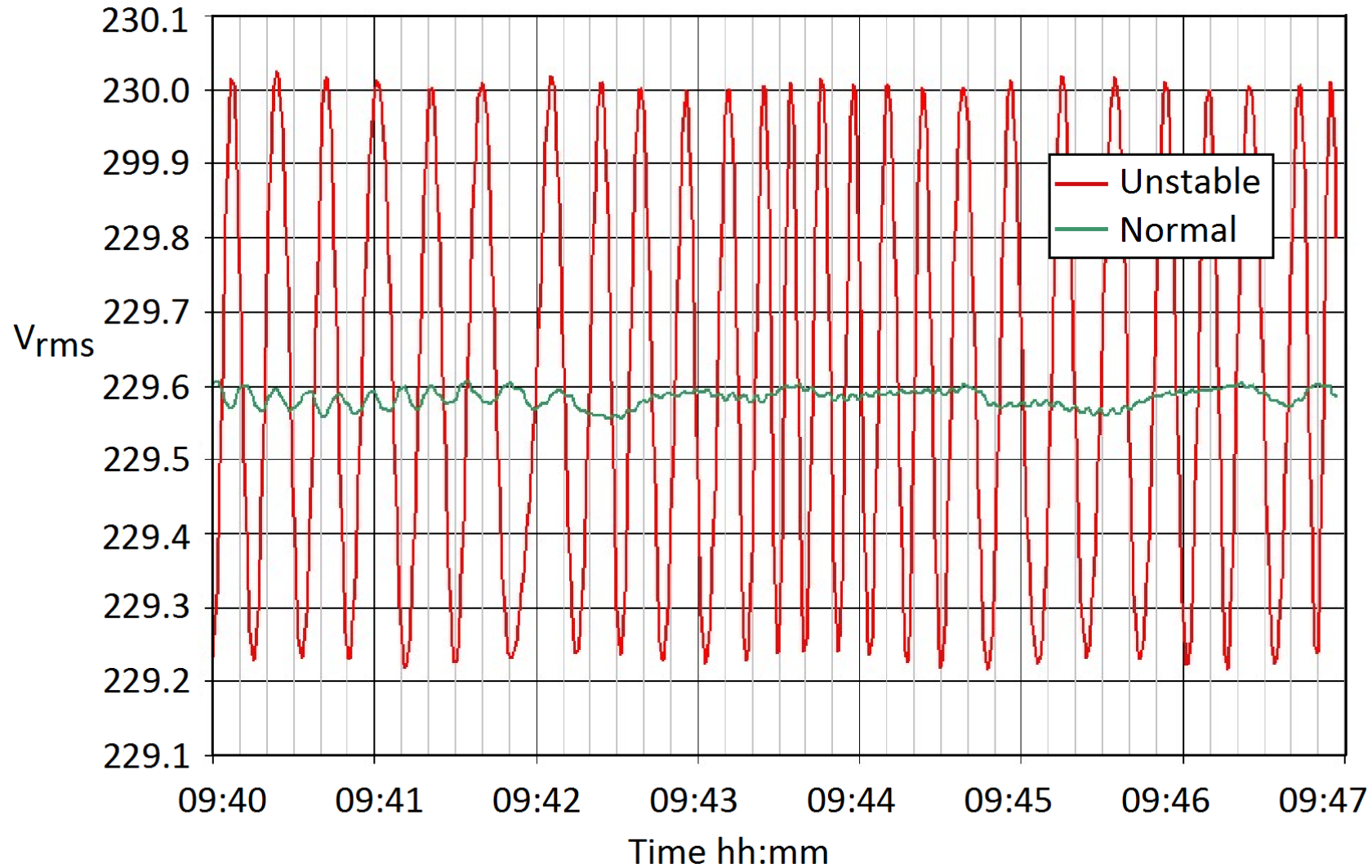
Equipment failure

- Physical damage
 - rough handling (cables, connectors)
 - gravity
- Electrical damage
 - overloaded inputs/outputs
 - incorrect power supply
- Old age, or extended “normal” use
- ... leading to a complete or partial change in the equipment characteristics, which may not be immediately detectable

Equipment failure - antenna



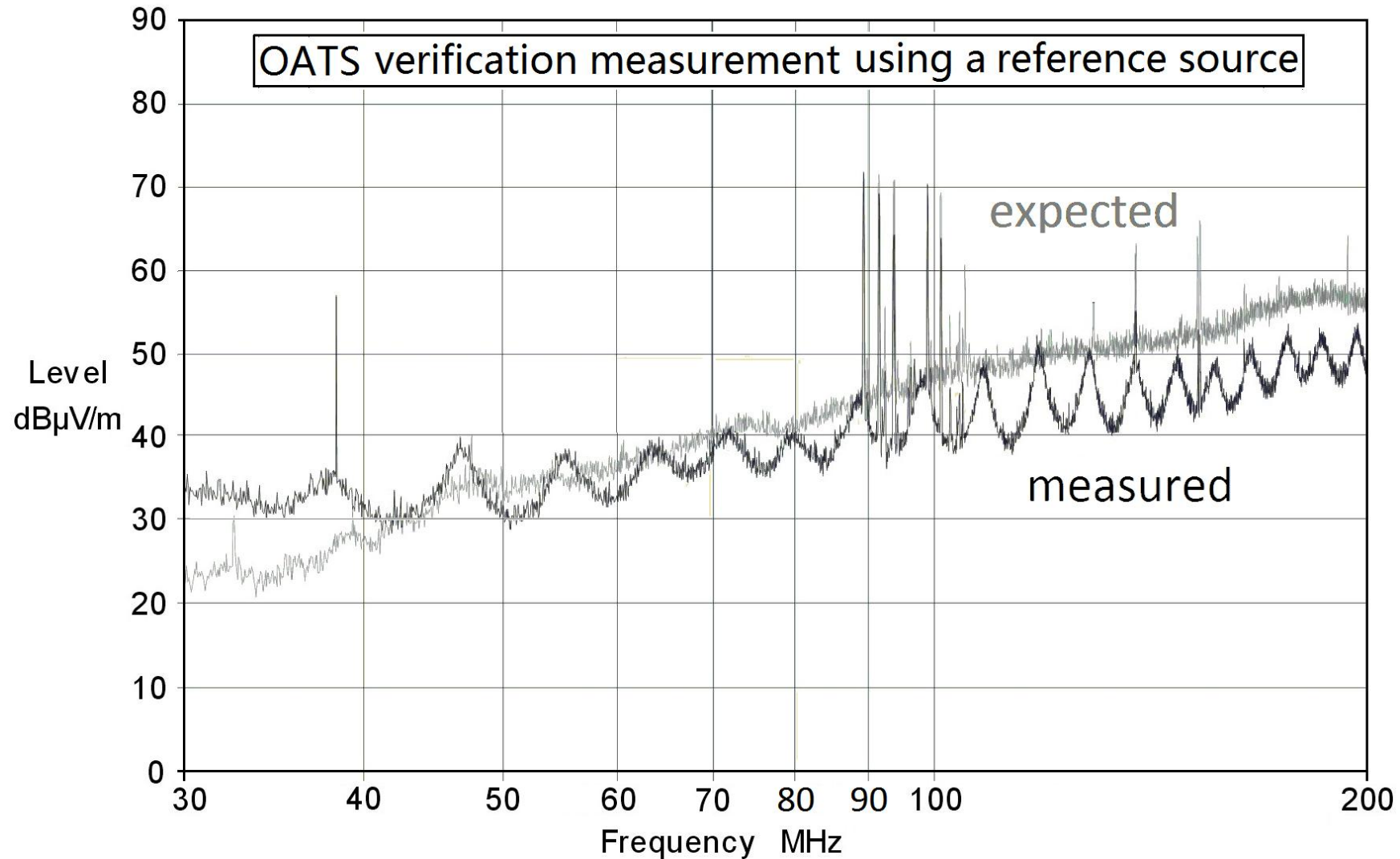
Equipment failure – mains PSU



Problem with the test setup

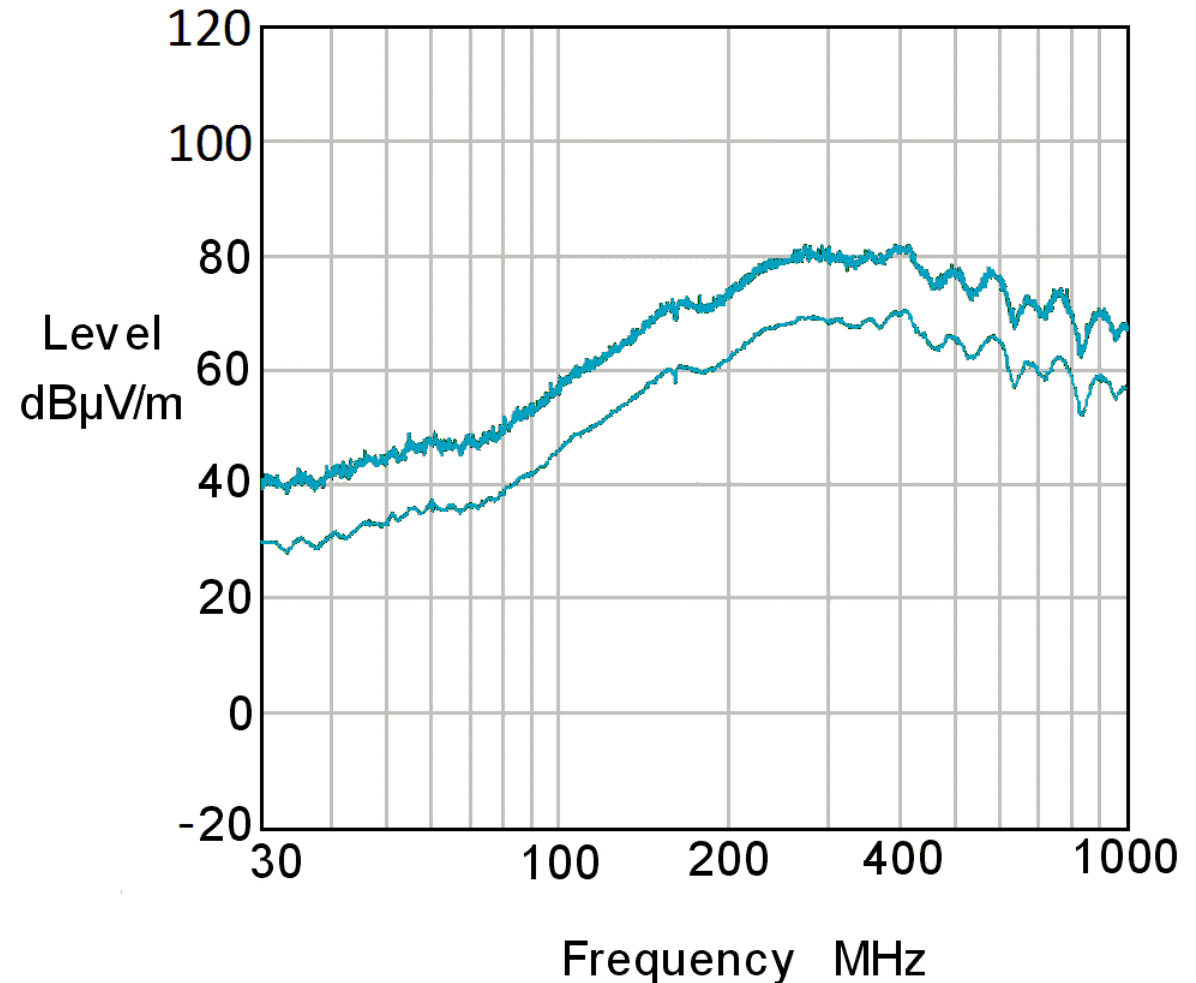
- Repeatability and consistency
 - Cable layouts
 - EUT positioning (especially > 1 GHz)
 - Test procedure or setup may need to be more rigorously defined
 - Multitasking, or reconfiguring test equipment
- Environment
 - Threats to infrastructure
 - Hard-to-see cabling
 - Aging or wear-and-tear e.g. absorber

Problem with the test setup



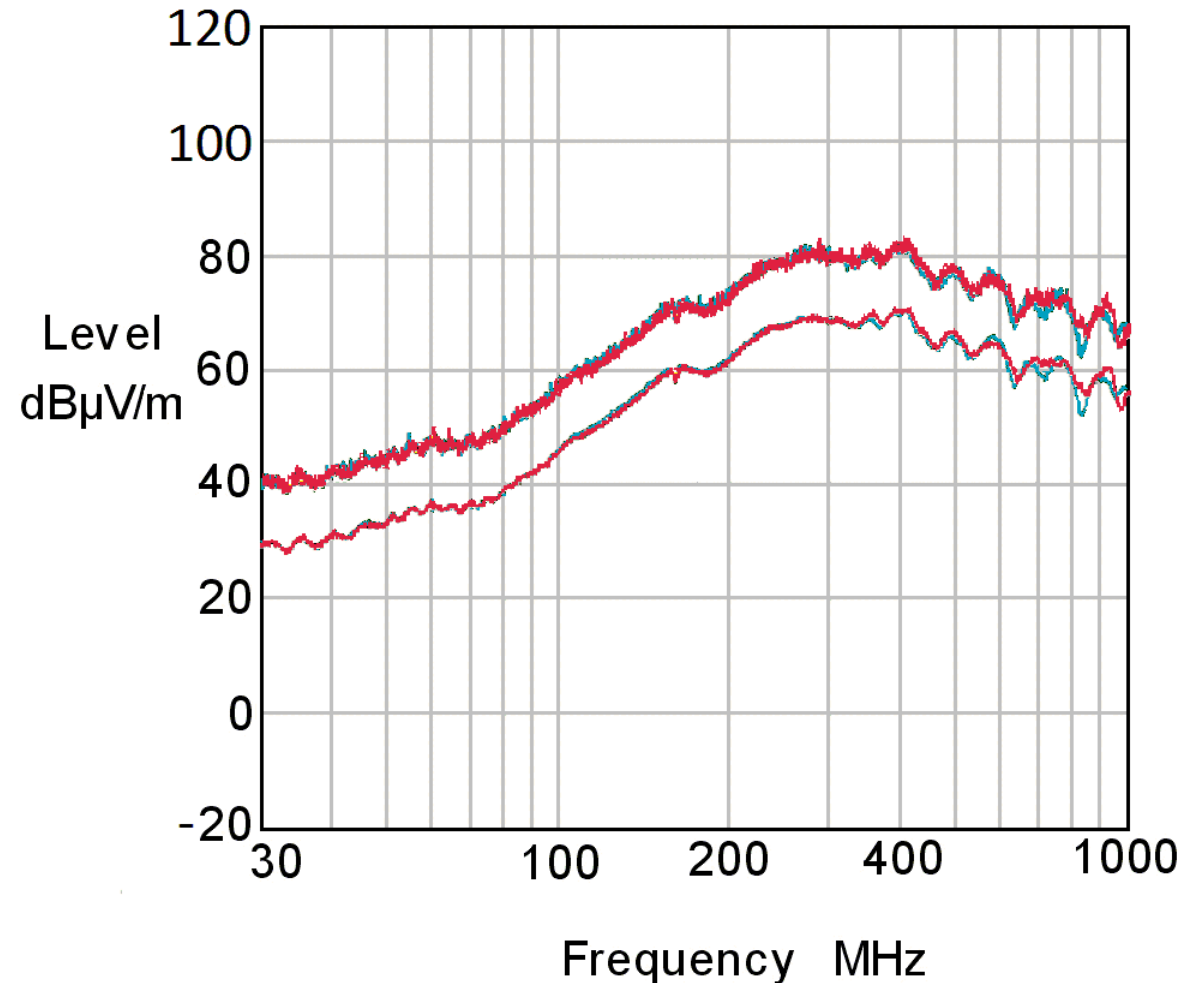
Problem with the test setup

- Fully Anechoic Room
- Wooden table
- Camera near antenna
- Uncovered patch-panel
- Reference measurement taken before making alterations



Problem with the test setup

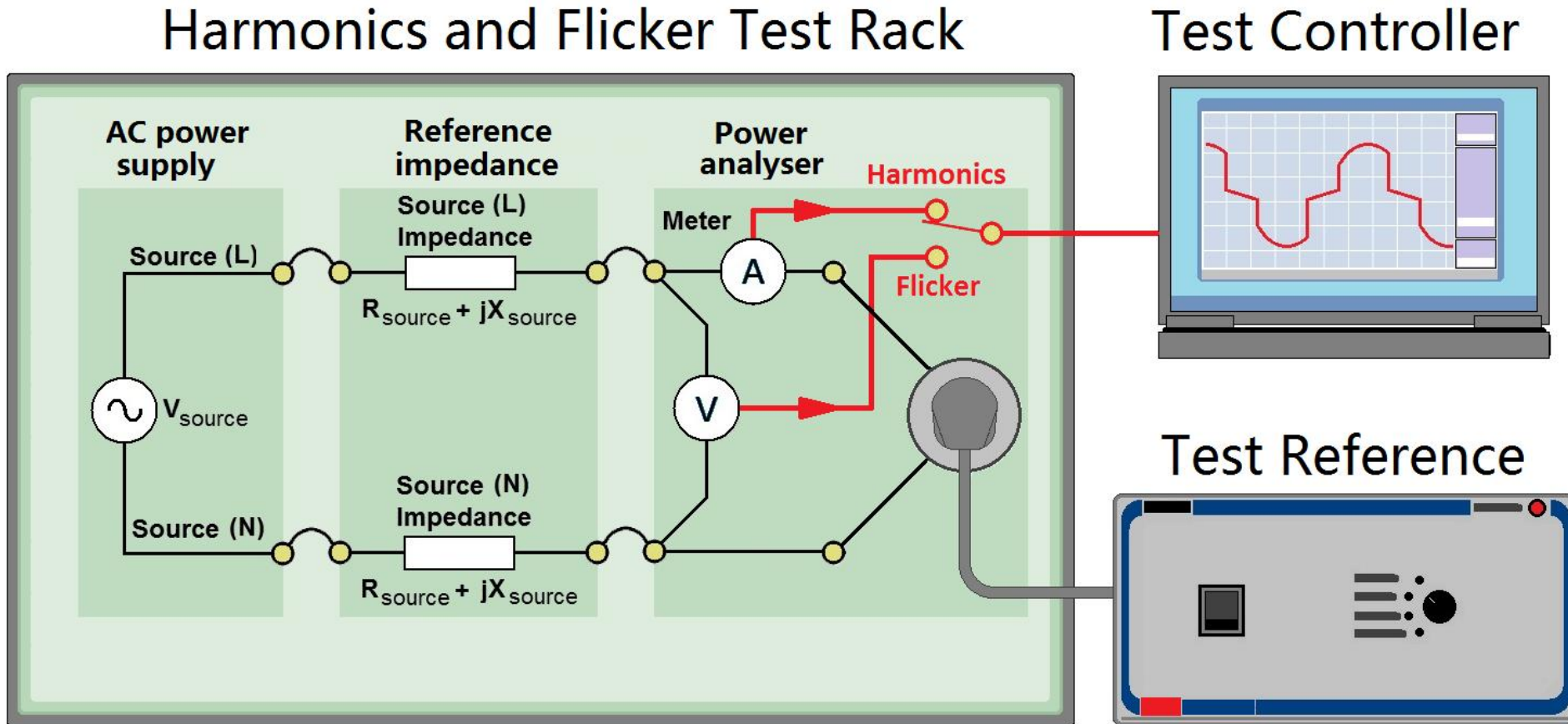
- Fully Anechoic Room
- Plastic table
- Camera moved away from antenna
- Patch-panel covered with spare ferrite



Operator error

- Everyone makes mistakes
 - Using the wrong settings or test set-up
 - Multi-purposed test equipment, new tests (> 1 GHz)
 - Gaps in record keeping (which factors applied?)
 - Training opportunity
- Unclear instructions
 - Open to interpretation
 - Not specifying certain criteria
 - Is this operator error?
- Operator indifference

Operator error – test set-up



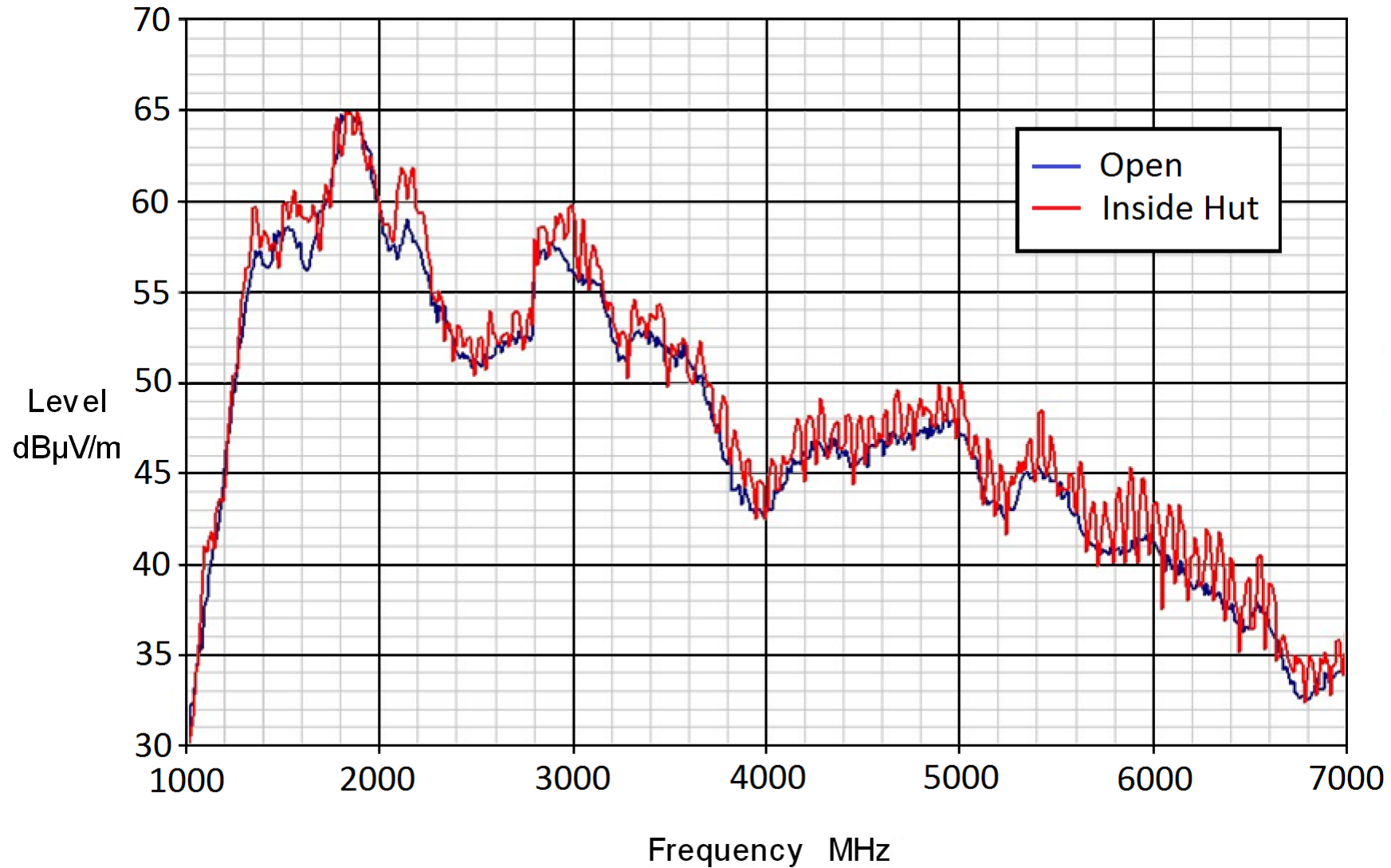
Operator error – test set-up

- Typical report that the Harmonics reading agrees, but the Flicker reading disagrees. All test equipment is calibrated.
- D_{\max} % low, P_{ST} low
 - Check the correct source impedance for flicker is being used
- D_{\max} % high, P_{ST} high
 - Check the source impedance, especially wiring
 - Including the impedance of the AC power supply
- D_{\max} % normal, P_{ST} high
 - Check the power analyser

Operator error – assumptions



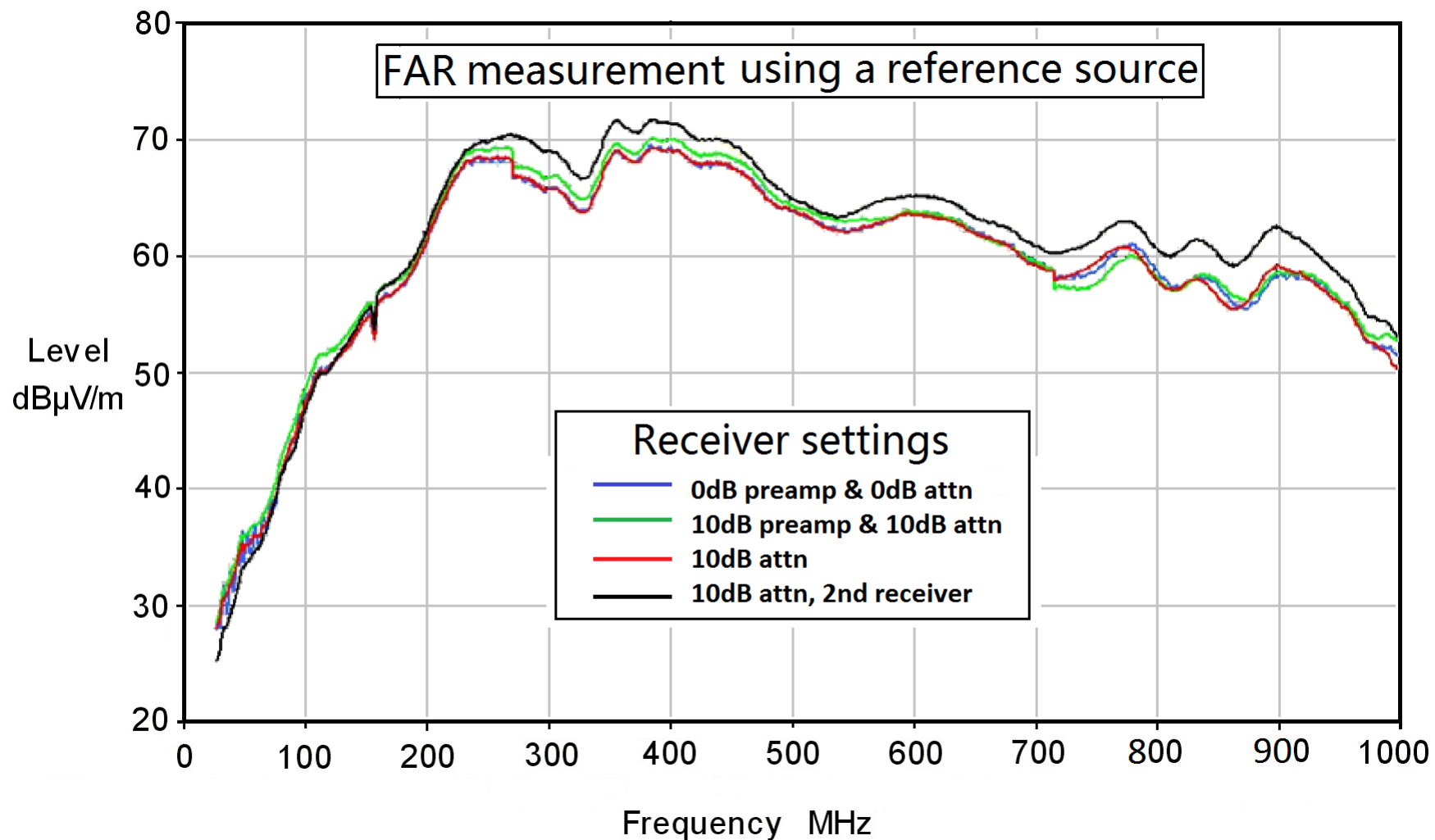
Operator error - assumptions



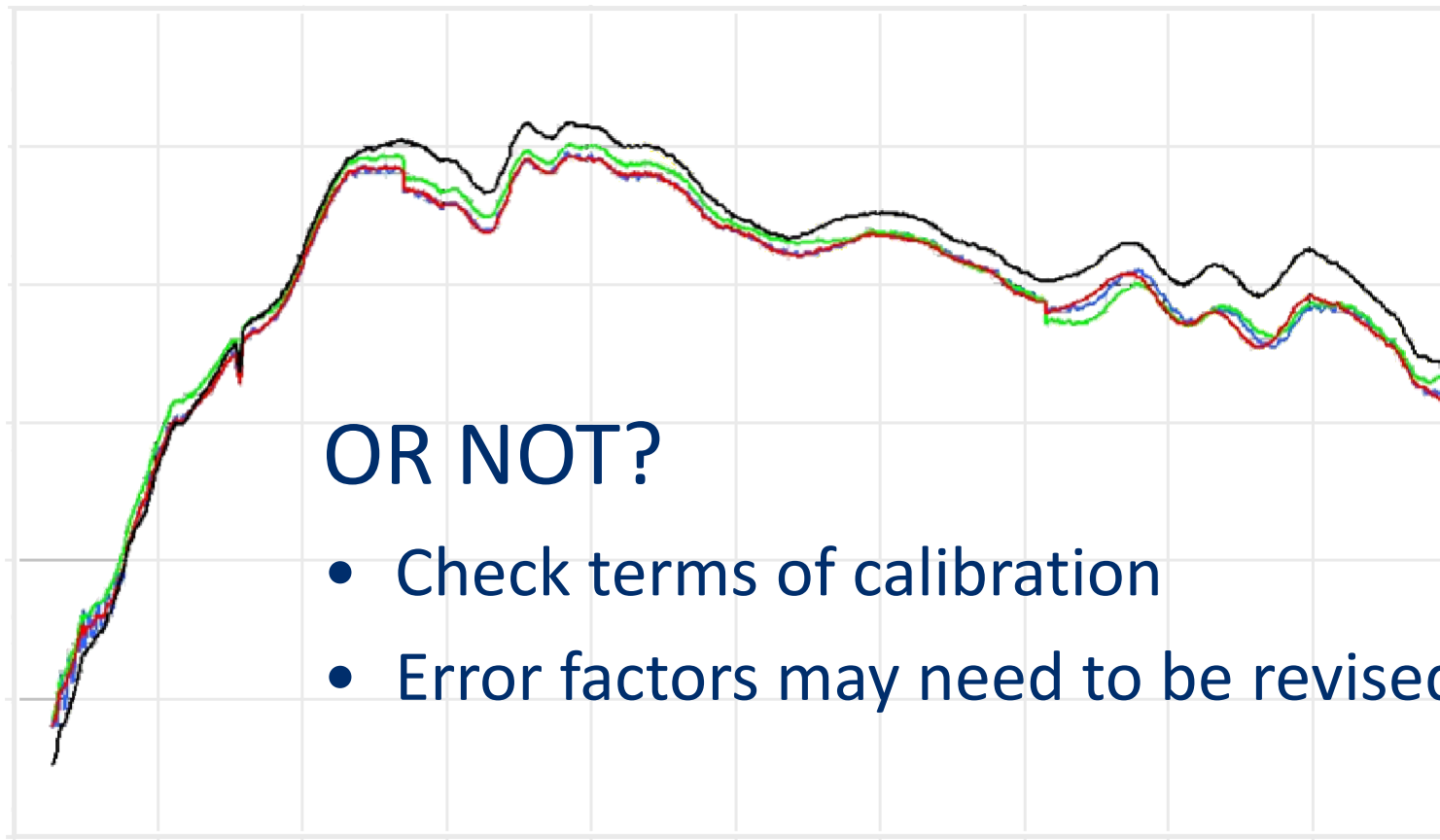
Equipment out of calibration

- Changes in equipment characteristics
 - Difference between what the equipment does and what you expect it to do
 - May still be within manufacturer's tolerances / specifications
- Regular calibration
 - Key part of QMS e.g. ISO 17025, ISO 9001 etc.
 - Gives a snapshot of the equipment's performance
 - How detailed is the calibration?
 - What happens between calibrations?
- Also where equipment is OK but the calibration has expired

Equipment out of calibration



Equipment out of calibration



Thank you

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