Statistics on quench locations of 1.3 GHz cavities at DESY

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Motivation

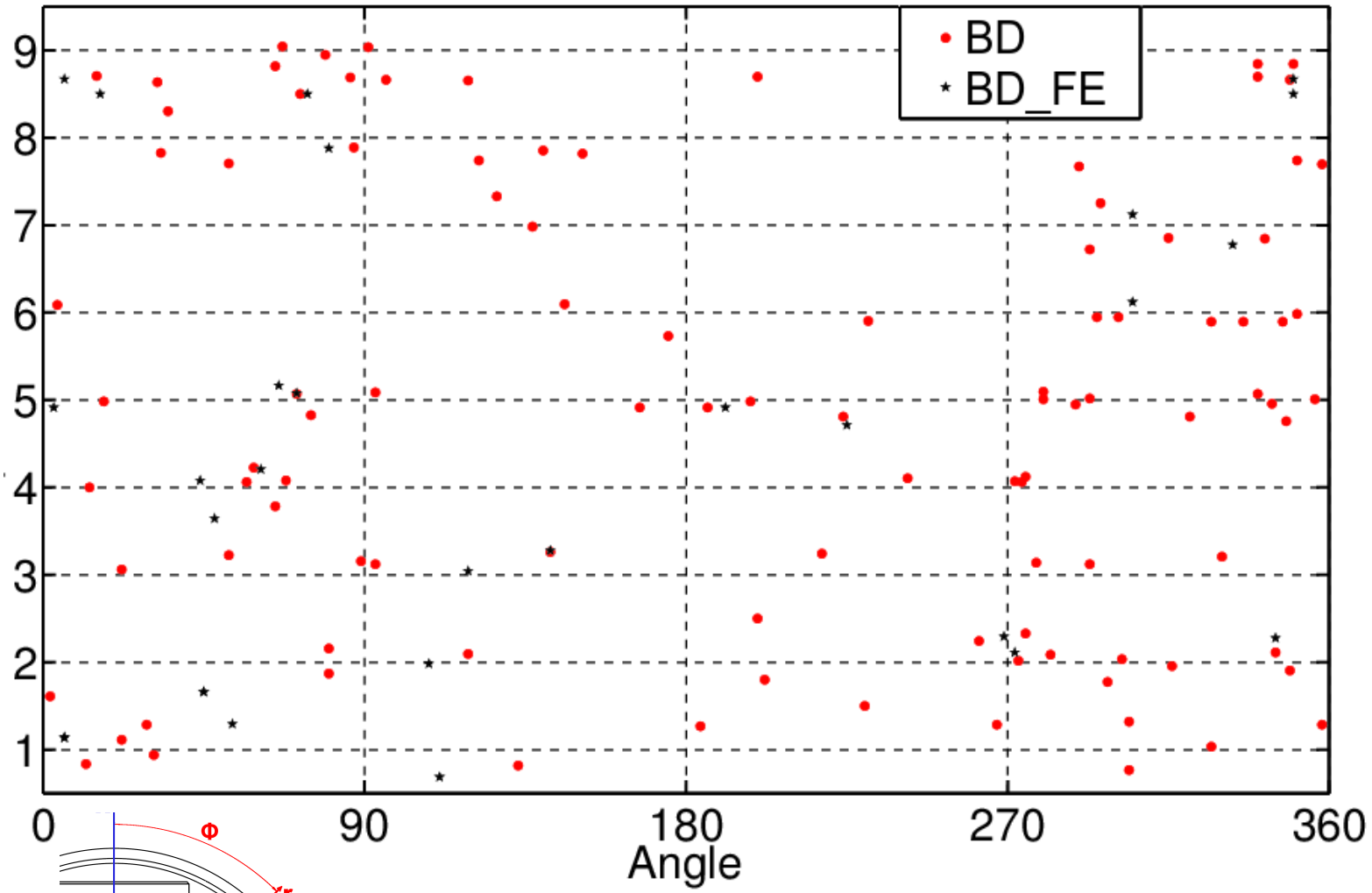
- Up to now: correlations of single quench locations with surface irregularities, no statistical analysis of quench locations

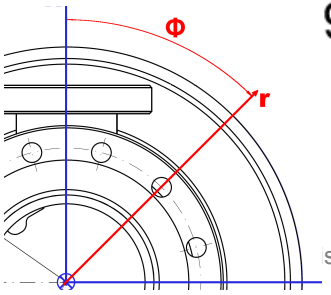
- Second sound @ DESY allowed about 30 cavity tests with quench localisation from 2010 to 2012:
  - Different surface treatments
  - Large grain and fine grain material

- 189 quenches detected for all 9 passband modes

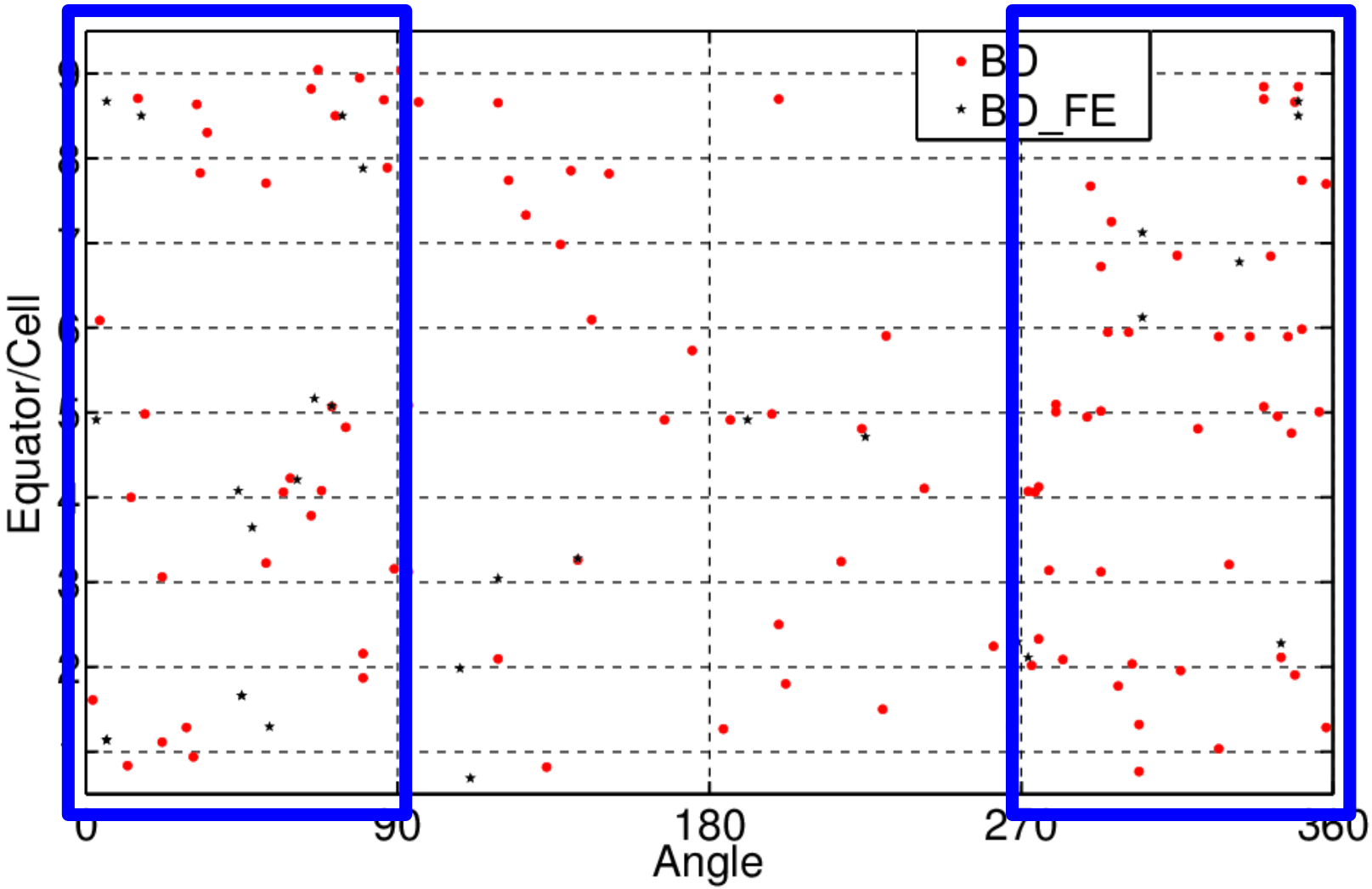
- 121 different quench locations

All quench locations

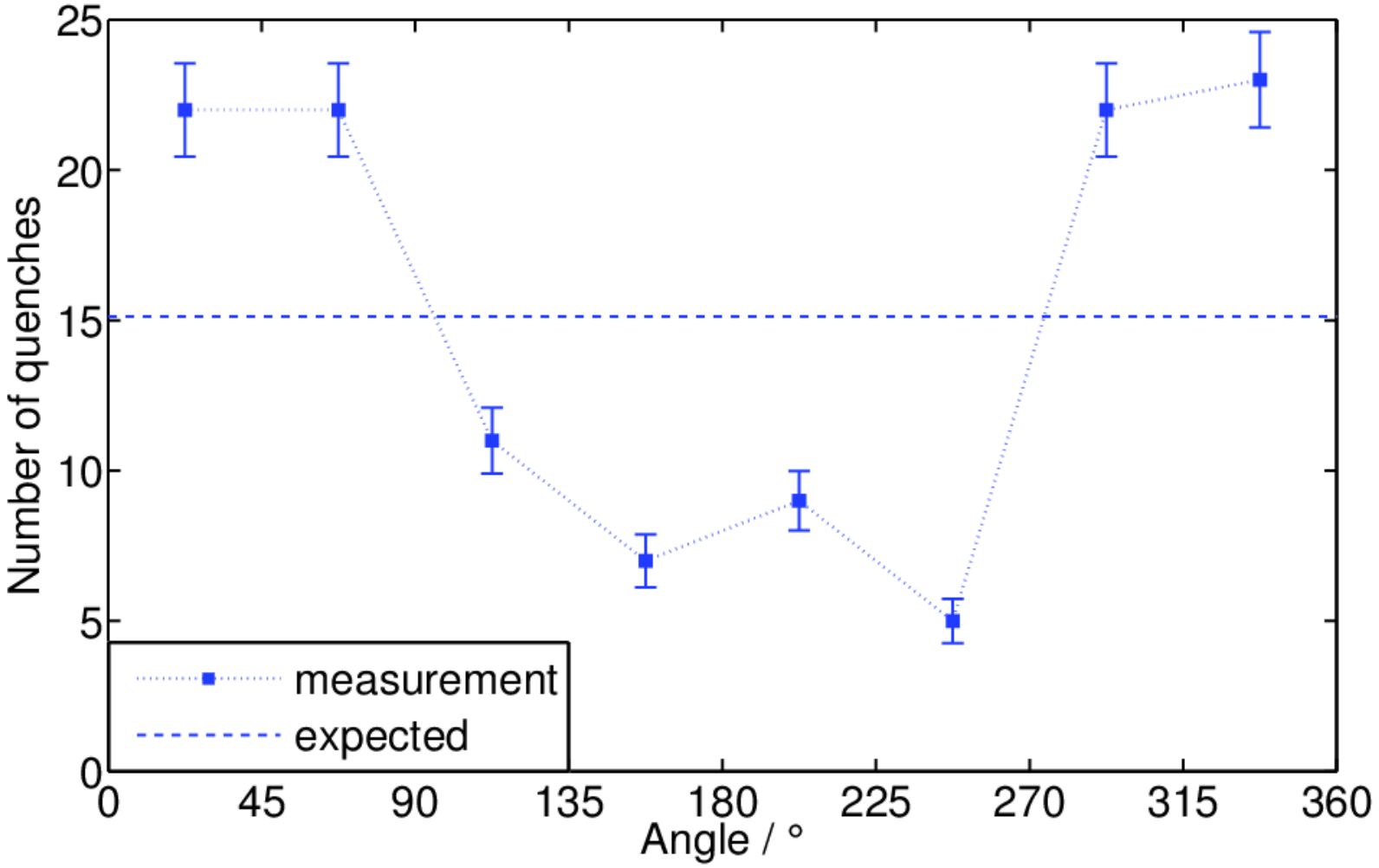




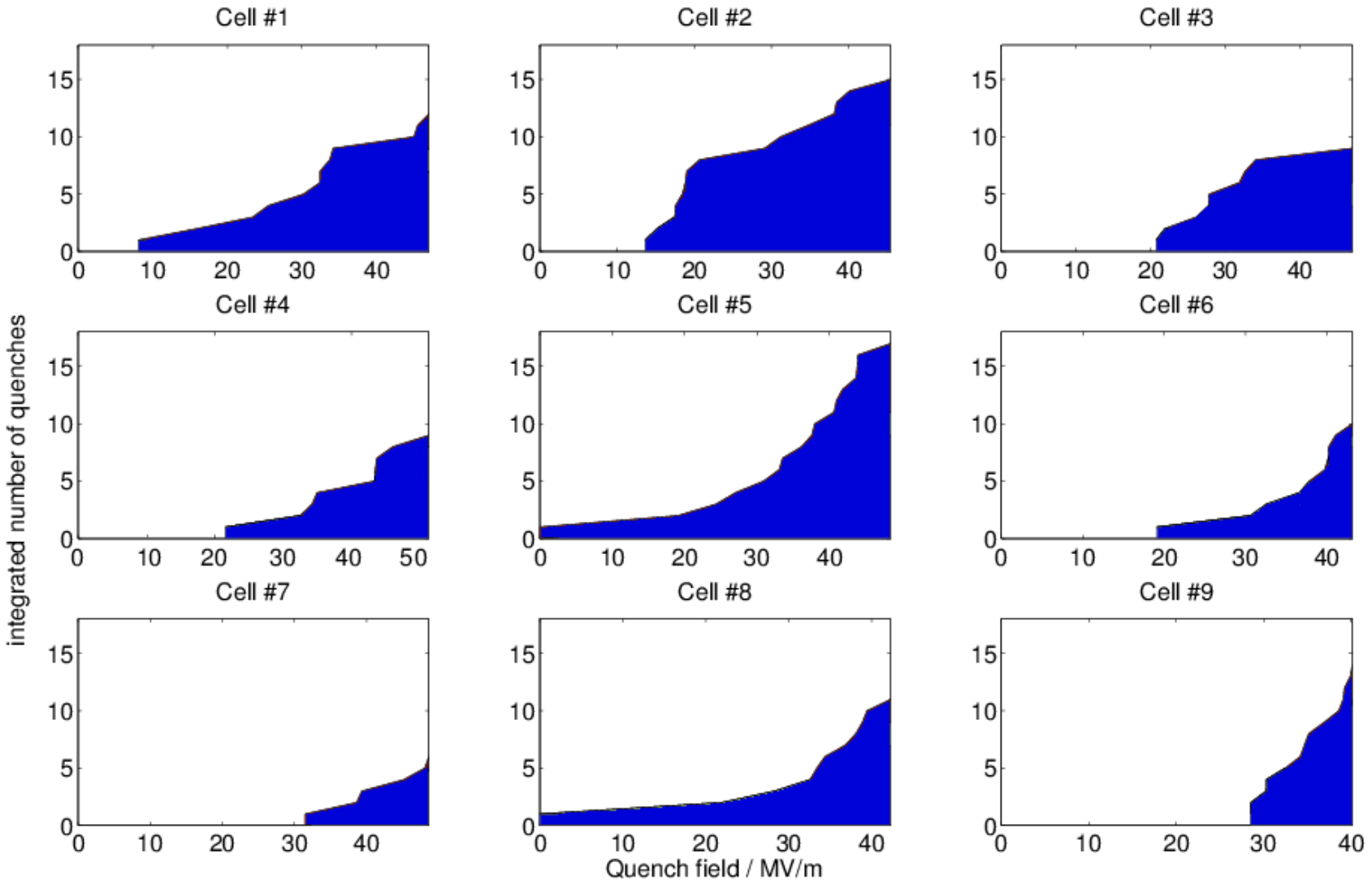
All quench locations, observations



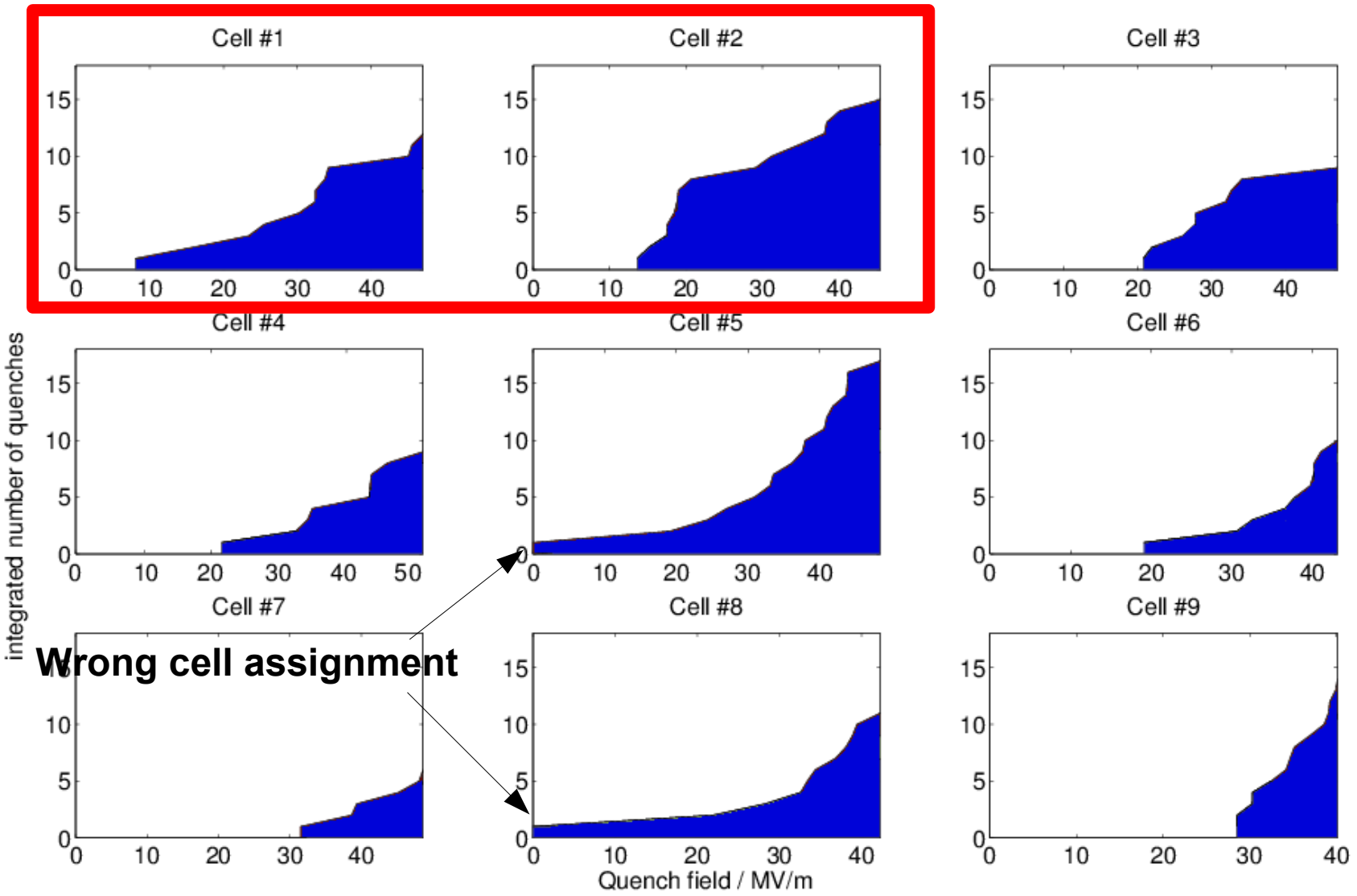
Angular distribution of quench locations



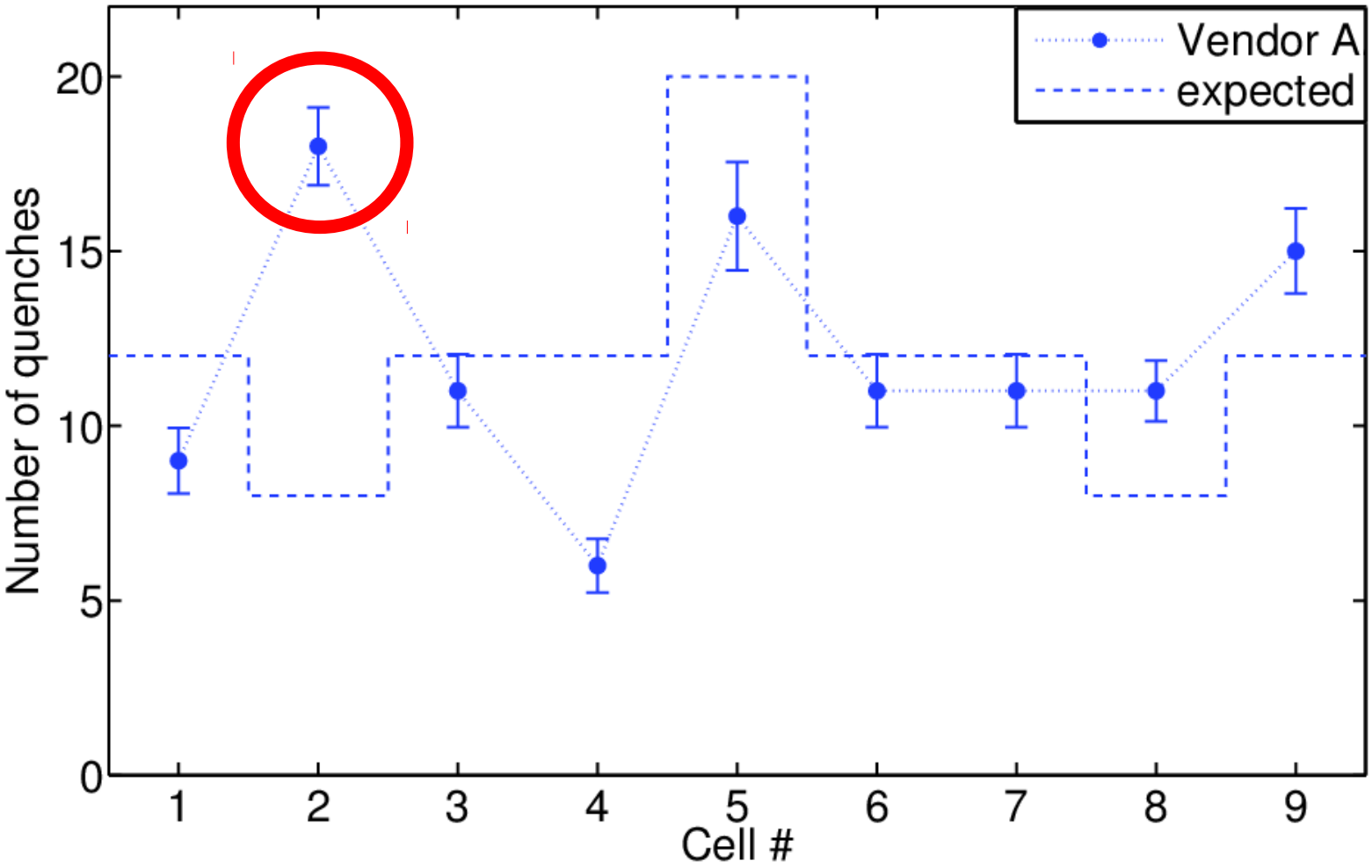
Quench fields in cells



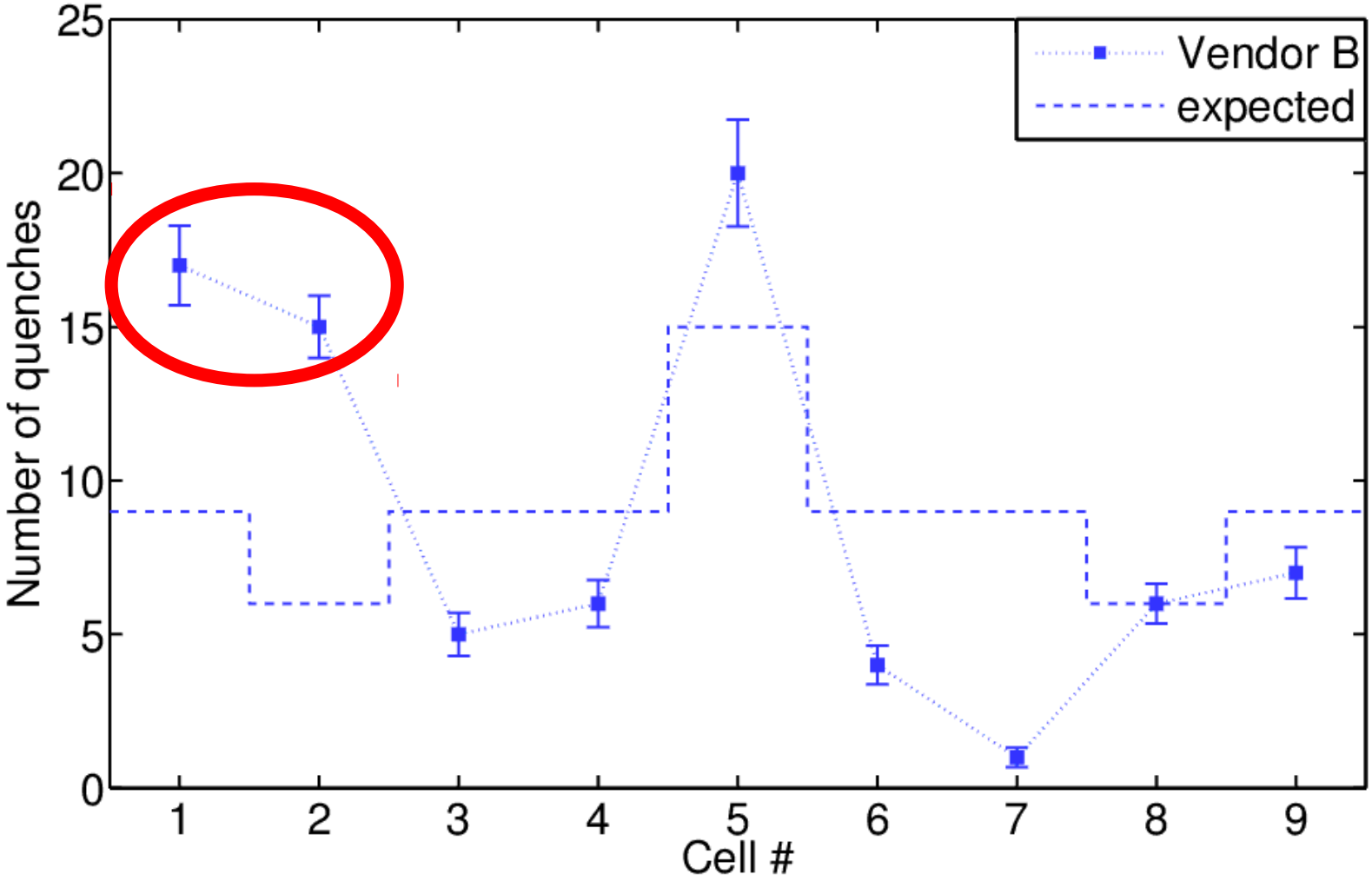
Quench fields in cells



Longitudinal distribution of quench locations



Longitudinal distribution of quench locations



Summary/Outlook

- Statistic analysis of quench locations revealed pattern
- Angular distribution shows excess in quenches at certain angular orientation (+/- 90° from the main coupler port)
  - No vendor dependence
  - No suspicious work step during cavity treatment at DESY
- Longitudinal orientation shows quenches at low fields in cells #1 and #2
- Quench distribution in cells also shows an excess of quenches in cell #1 and #2
  - For cell #2 an excess at both vendors is seen
  - For cell #1, only one vendor shows more quenches than expected
- More cavity tests and data required!
  - 24 ILC-HiGrade cavities will be extracted from the European XFEL series production
  - **Question: Statistics from other labs and cavity vendors?**

Acknowledgements

! Thank you for your attention !

More details:

- F. Schlander, *"Statistical analysis of quench locations of 1.3 GHz superconducting rf cavities at DESY",* ILC-HiGrade-Report-2012-002, http://www.ilc-higrade.eu
- F. Schlander, Dissertation, to be published …

Special thanks to all people involved in the 1.3 GHz 'cavity business' at Hall III at DESY