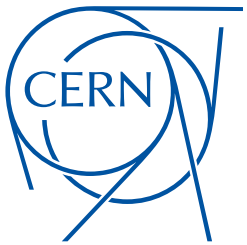
Impact of 7 TeV magnetic errors on optics.

Andy Langner, Rogelio Tomas

European Organization for Nuclear Research (CERN) & Universität Hamburg

LCU meeting, 28.10.2013

Acknowledgments: M. Giovannozzi



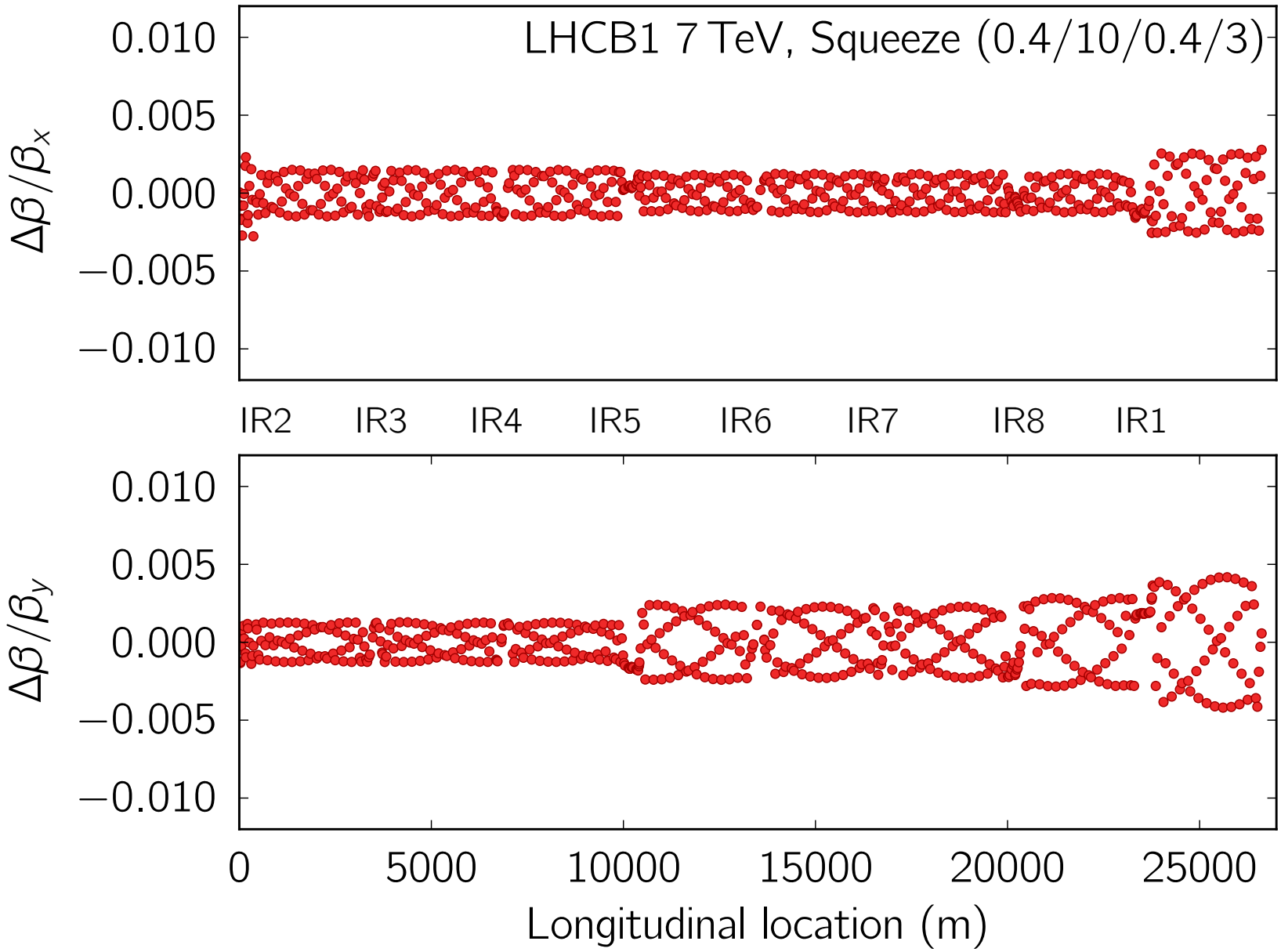
Operation of the LHC towards 7 TeV.

- Main magnets will enter new regime
- Impact on the optics is studied

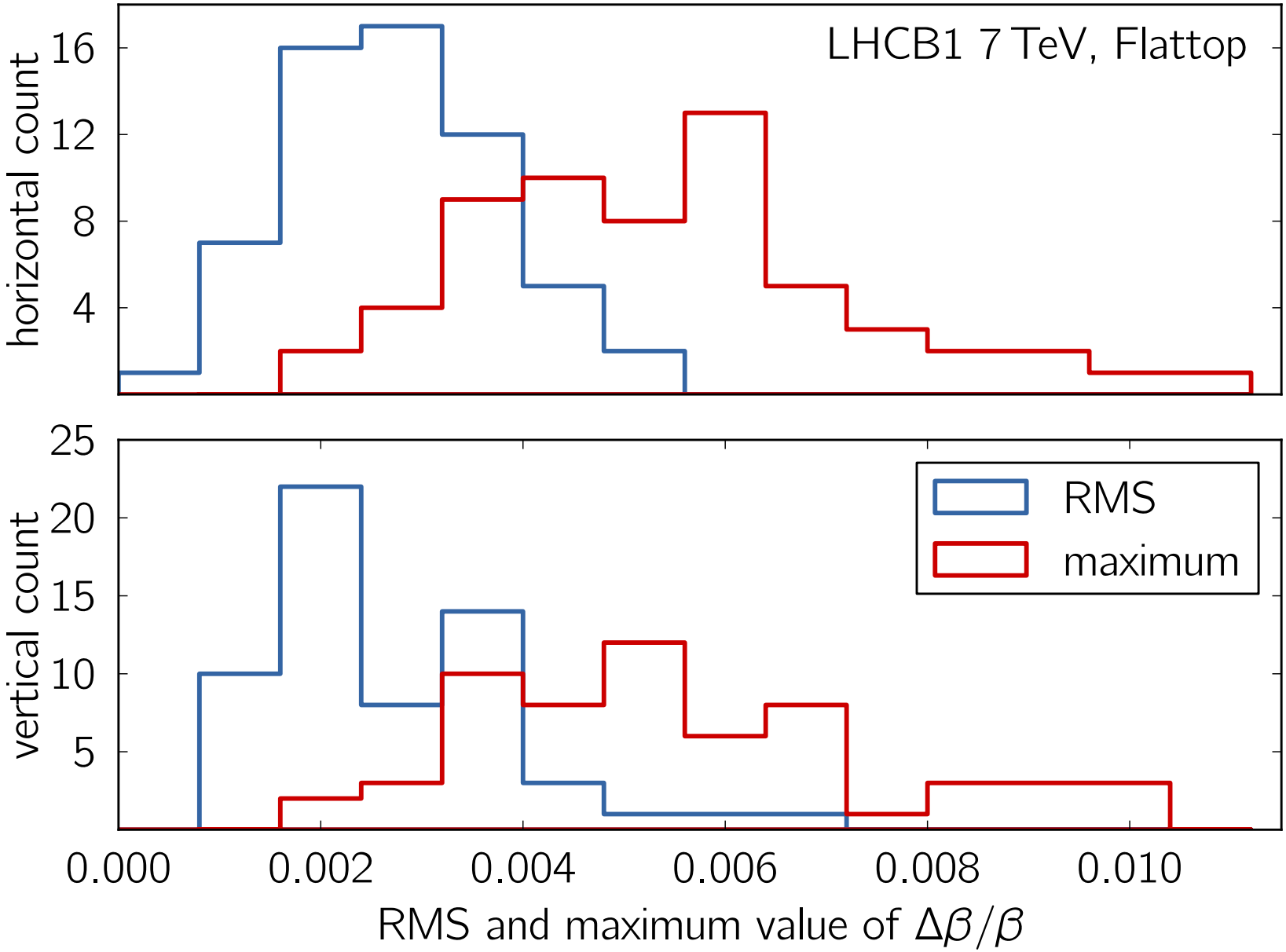
→ Hysteresis
- FiDeL model describes ramp up branch
- This causes an error for magnets which are ramped down, e.g. during the squeeze
- 30 magnets from the MQY, MQM and MQML family

→ Saturation at high currents introduce an uncertainty
- This errors is treated statistically
- Simulation of 60 cases with random gradient errors following a Gaussian distribution within the saturation uncertainty
- Considered magnet types: MQ, MQY, MQM, MQML, MQMC and MQW

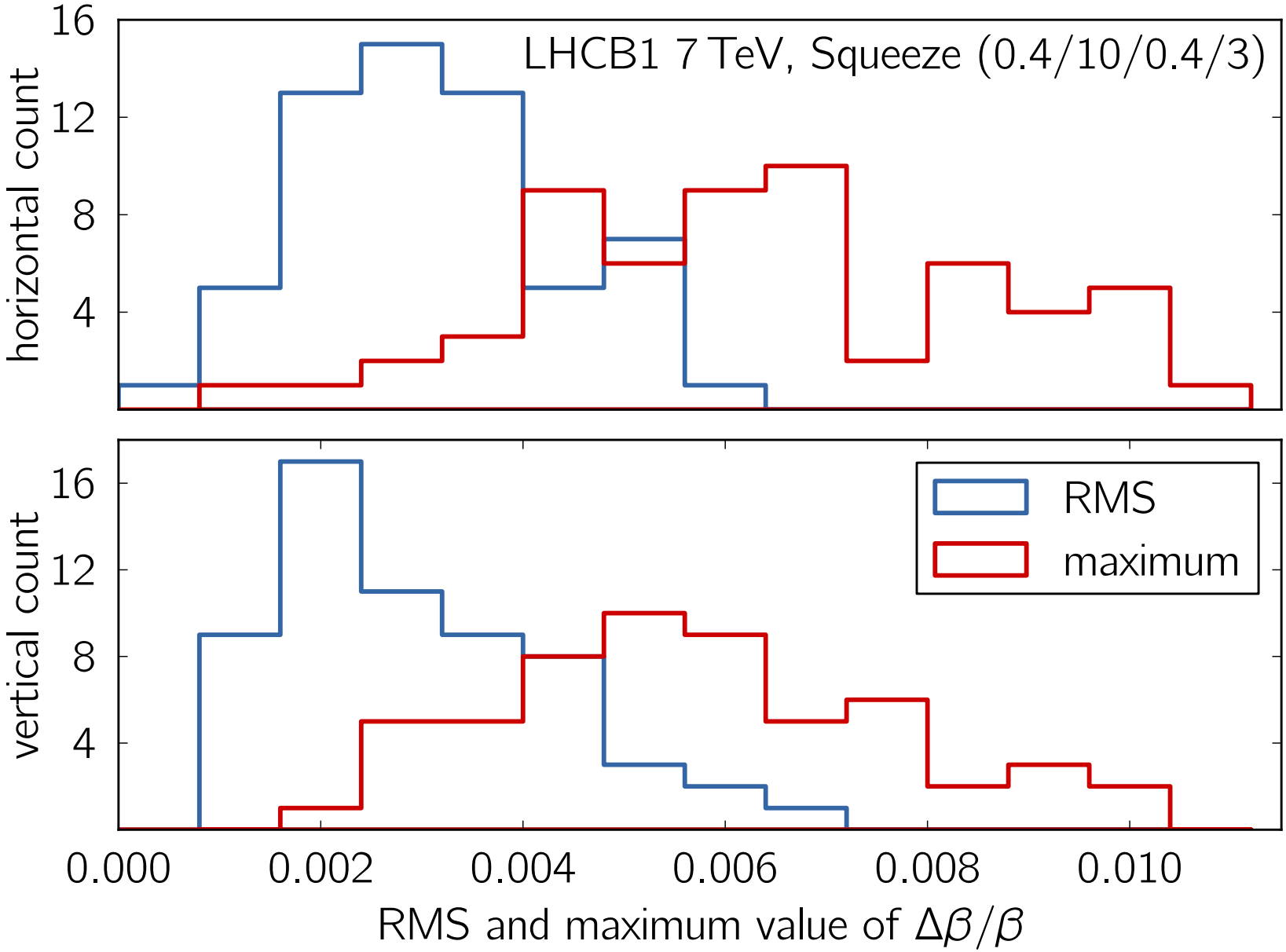
Impact of hysteresis on the beta-beat.



Saturation at flattop.



Saturation and hysteresis at squeeze optics.



Conclusions.

- For the hysteresis alone, a very small peak beta-beat of 0.5% is observed
- Saturation and hysteresis at injection and squeeze optics show again a small peak beta-beat of 1% or below