

# MD#3205: Beam screen shielding from QH discharge at 70 K

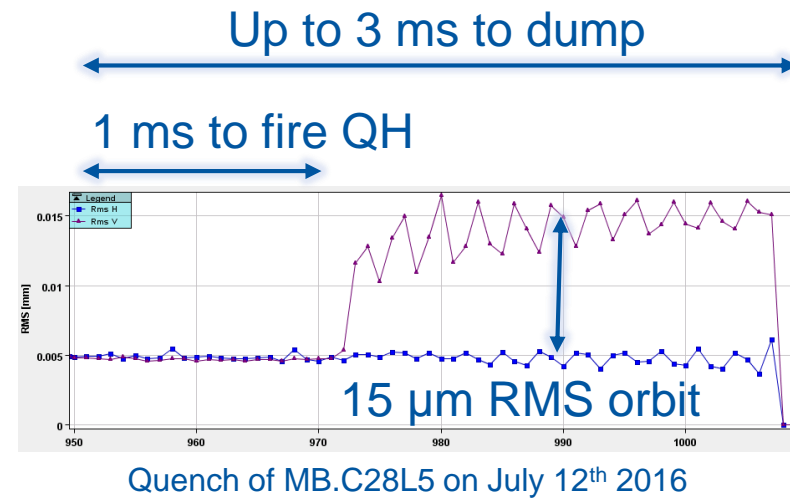
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# Introduction

- QH kicks have been observed in the LHC for MB magnets, the kick is faster than the beam screen should allow
- Simulations don't reproduce the observed LHC events
- Some MQXF QH for the HL-LHC would give kicks up to  $1.28 \sigma$  and lead to critical losses
- The MQXF beam screen could buy some critical time but MQXF shielding cannot be predicted yet

## Goal:

- Improve understanding of beam screen shielding effect:
  - Improve consistency of simulation models
  - Determine criticality of QH discharges for HL-LHC triplet
- Magnetic field can change resistivity by a factor 2, temperature (70 K) can give us a factor 20.



# Procedure

- Around 15:00 the day before the MD, set BS temperature to 70 K in the cell containing MB.C28L5.
- Inject 3 nominal bunches per beam  
(3 bunches allows 30  $\mu$ s resolution on the kick with ADTObsBox)
- Start ramp
- Fire QH in MB.C28L5 when reaching 3.5 TeV
- Quench at 6 kA will take  $\sim$ 2h to recover
- Repeat at top energy (6.5 TeV)
- Cryo recovery absorbed by TS
- MP3 experts will verify protection system performance and readiness for repowering.

# Machine Protection aspects

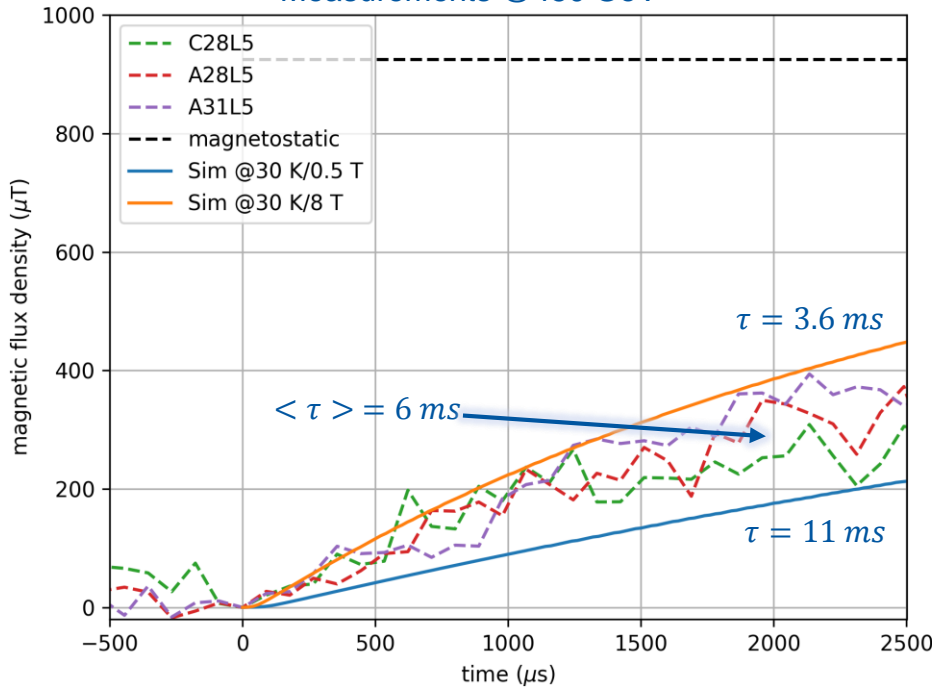
- Two additional quenches of MB.C28L5 (previously used in MD#1826)
  - Approved by MP3 on August 29<sup>th</sup>
- Beam screen warm up to 70 K
  - Approved by VSC for MD block 4
- No masking of any interlock
- Same kick on the beam (0.15  $\sigma$  at 3.5 TeV, 0.1  $\sigma$  at 6.5 TeV) as during operational quench of MB dipole with 3 nominal bunches



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# Past measurements

Measurements @450 GeV



Measurements @6.5 TeV

