



Roadmap for flux jumps

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THE ISSUE

- Nb_3Sn has flux jumps during ramp due to current redistributions
 - Spikes of the order of 1 V, and of the range of 10 ms, in the differential signal below 8 kA in MQXF short models
- This induces two problems:
 - Protection threshold have to be current dependent (new hardware has been built, see [R. Denz](#) talks)
 - Impact on the beam dynamics – subject of this meeting

FLUX JUMPS IMPACT ON THE BEAM

- First part: study flux jump size and current dependence
 - Find a standard plot to describe the phenomenology
 - We have several data from short models (see H. Bajas)
- Second part: how the flux jump scale with magnet length
 - We know they get larger, but scaling is still unknown
 - No data is available in MQXFAP1 (no fast DAQ)
 - We should have data for the MQXFAP2 (tested in July)
- Third part: how the power converter reacts to the jump (see S. Yammine talk)
 - What is the voltage jump in the power converter (total signal)?
 - How does it react to compensate?
 - Can be seen by looking at the current vs time during ramp

FLUX JUMPS IMPACT ON THE BEAM

- Fourth part: how the magnet reacts
 - We need fast probes (10 kHz), rotating coils can be used in static mode (pick up coils)
 - See talk of [L. Fiscarelli](#)
- Fifth part: how the cold bore and beam screen filters
 - The beam screen induces an additional filter
 - This can be simulated (non trivial but can be done)
 - This can be measured by a probe when the beam screen is inserted (first magnet with beam screen measured in second half of 2018)
- Sixth part: beam dynamics simulations
 - What is the size of the phenomena that becomes relevant?
 - Studies started already, see talk in WP2 March 6 2018 <https://indico.cern.ch/event/706991>
 - Threshold of attention is 10^{-6} variations