Update MBHA-001
2020-03-10

TE-MSC-TF

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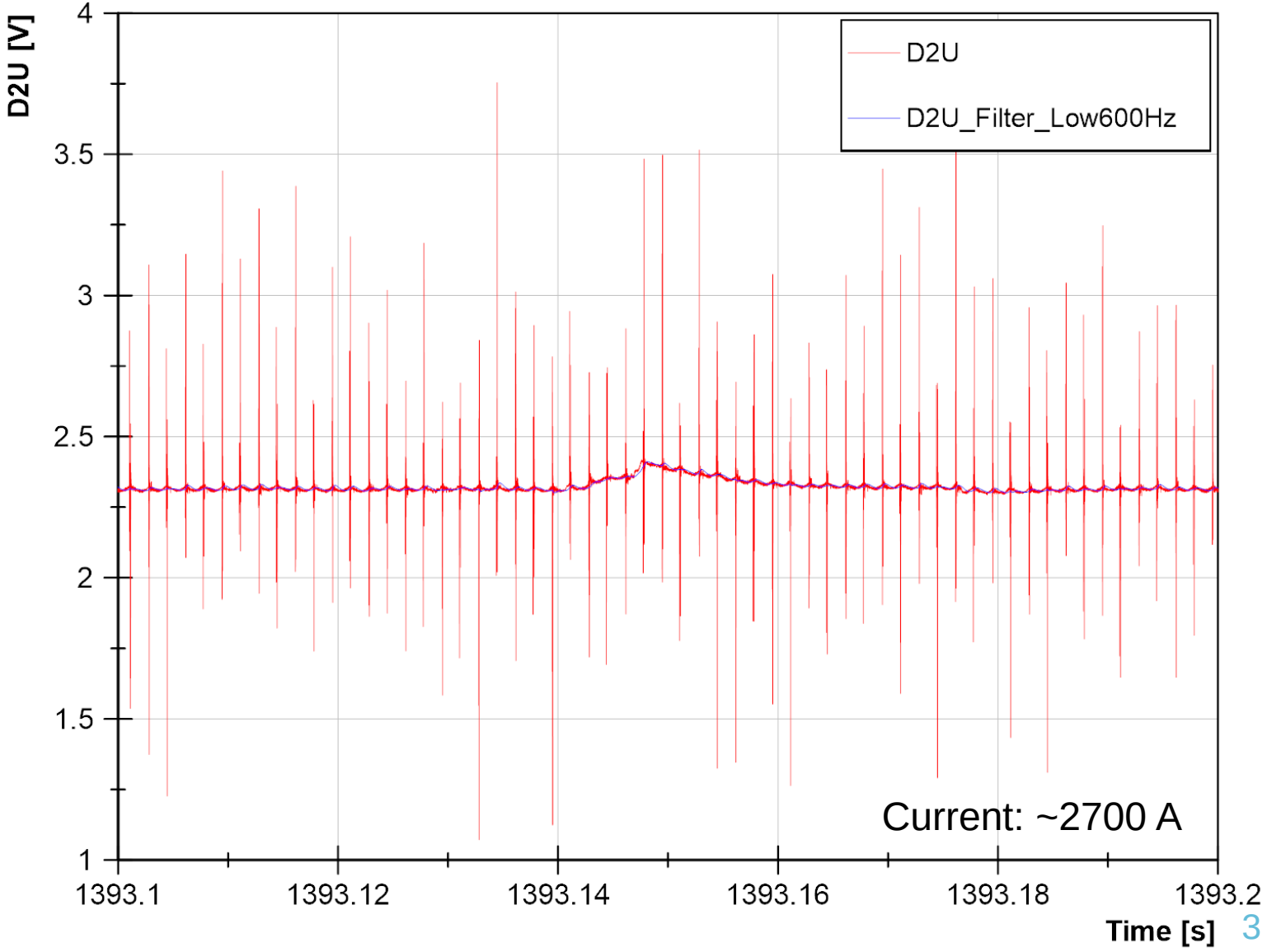
Acknowledgements to all involved.

Tests done since last meeting

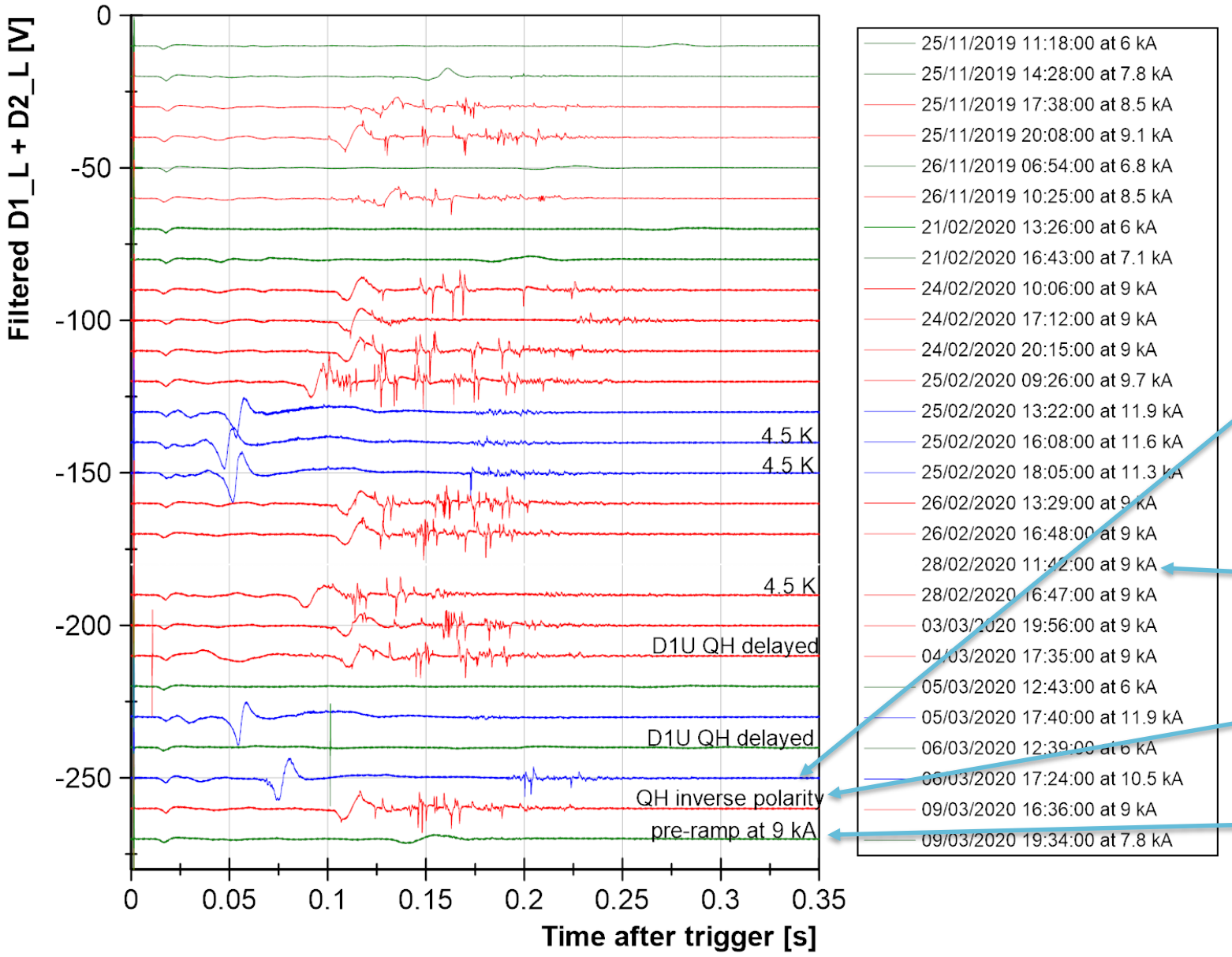
- 10.5 kA discharge, standard QH
- Reflectometry & impedance (Jaromir)
- SPA at nominal current
- 9 kA discharge, QH with inverse polarity
- (flux jump trip at 200 A)
- Ramp to 9 kA, ramp down to 7.8 kA and discharge QH with inversed polarity

SPA (-125 A/s) at nominal current

- Very noisy signals due to power converter
- No symmetric spikes visible
  - Low pass filter at 600 Hz would show the presence of spikes
- More in-depth analysis to follow



Summary of discharges so far



Color code:

- I < 8 kA
- 8 kA < I < 10 kA
- I > 10 kA

10.5 kA test: more and larger spikes than at 11.85 kA, fewer than at 9 kA.

DAQ not connected, only recorded with uQDS

9 kA with inverse QH polarity: same as standard polarity

7.8 kA with pre-ramp at 9 kA: no spikes

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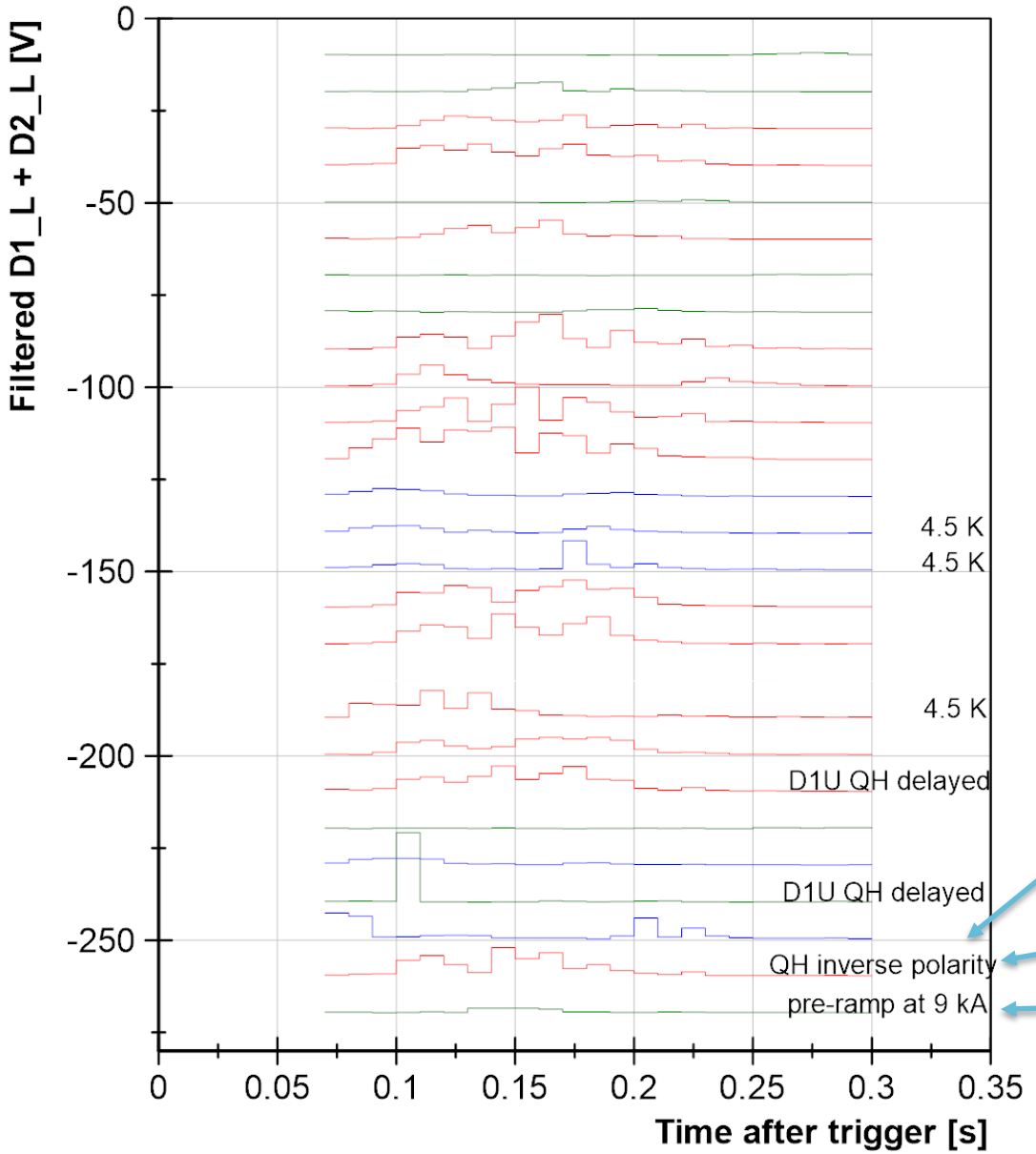

25/11/2019 11:18:00 at 6 kA
25/11/2019 14:28:00 at 7.8 kA
25/11/2019 17:38:00 at 8.5 kA
25/11/2019 20:08:00 at 9.1 kA
26/11/2019 06:54:00 at 6.8 kA
26/11/2019 10:25:00 at 8.5 kA
21/02/2020 13:26:00 at 6 kA
21/02/2020 16:43:00 at 7.1 kA
24/02/2020 10:06:00 at 9 kA
24/02/2020 17:12:00 at 9 kA
24/02/2020 20:15:00 at 9 kA
25/02/2020 09:26:00 at 9.7 kA
25/02/2020 13:22:00 at 11.9 kA
25/02/2020 16:08:00 at 11.6 kA
25/02/2020 18:05:00 at 11.3 kA
26/02/2020 13:29:00 at 9 kA
26/02/2020 16:48:00 at 9 kA
28/02/2020 11:42:00 at 9 kA
28/02/2020 16:47:00 at 9 kA
03/03/2020 19:56:00 at 9 kA
04/03/2020 17:35:00 at 9 kA
05/03/2020 12:43:00 at 6 kA
05/03/2020 17:40:00 at 11.9 kA
06/03/2020 12:39:00 at 6 kA
08/03/2020 17:24:00 at 10.5 kA
09/03/2020 16:36:00 at 9 kA
09/03/2020 19:34:00 at 7.8 kA

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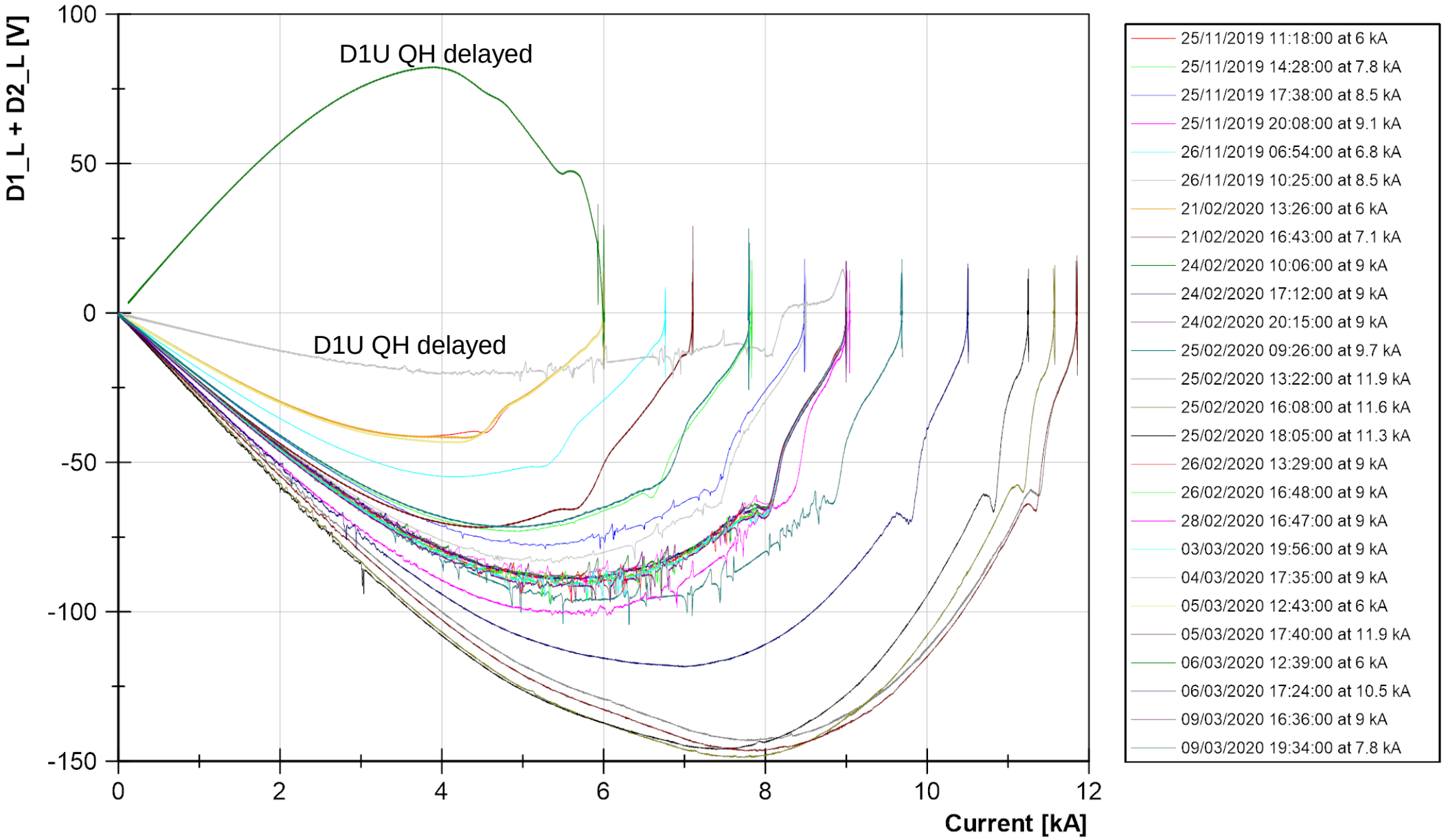
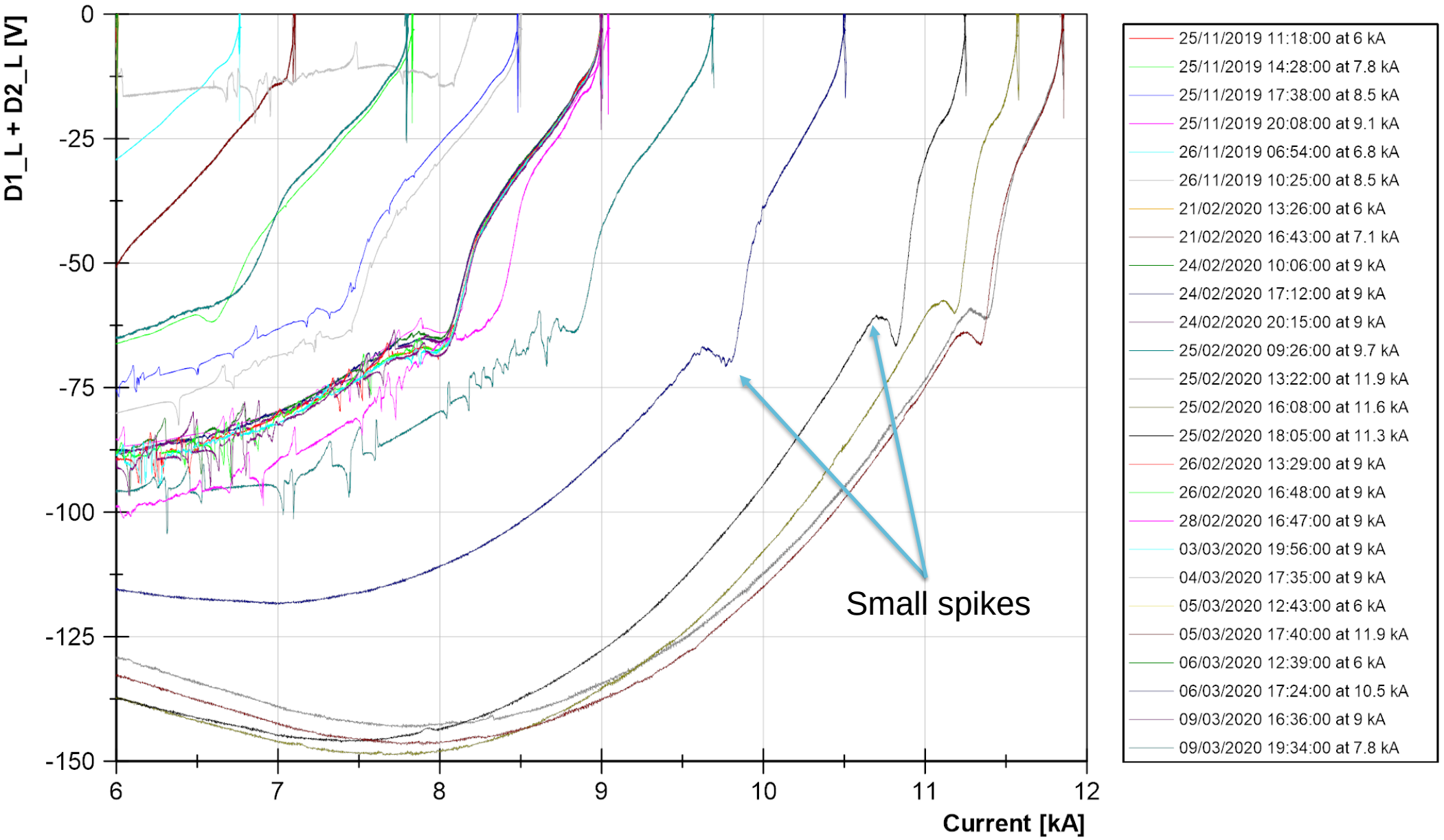
Suspected short voltage vs current

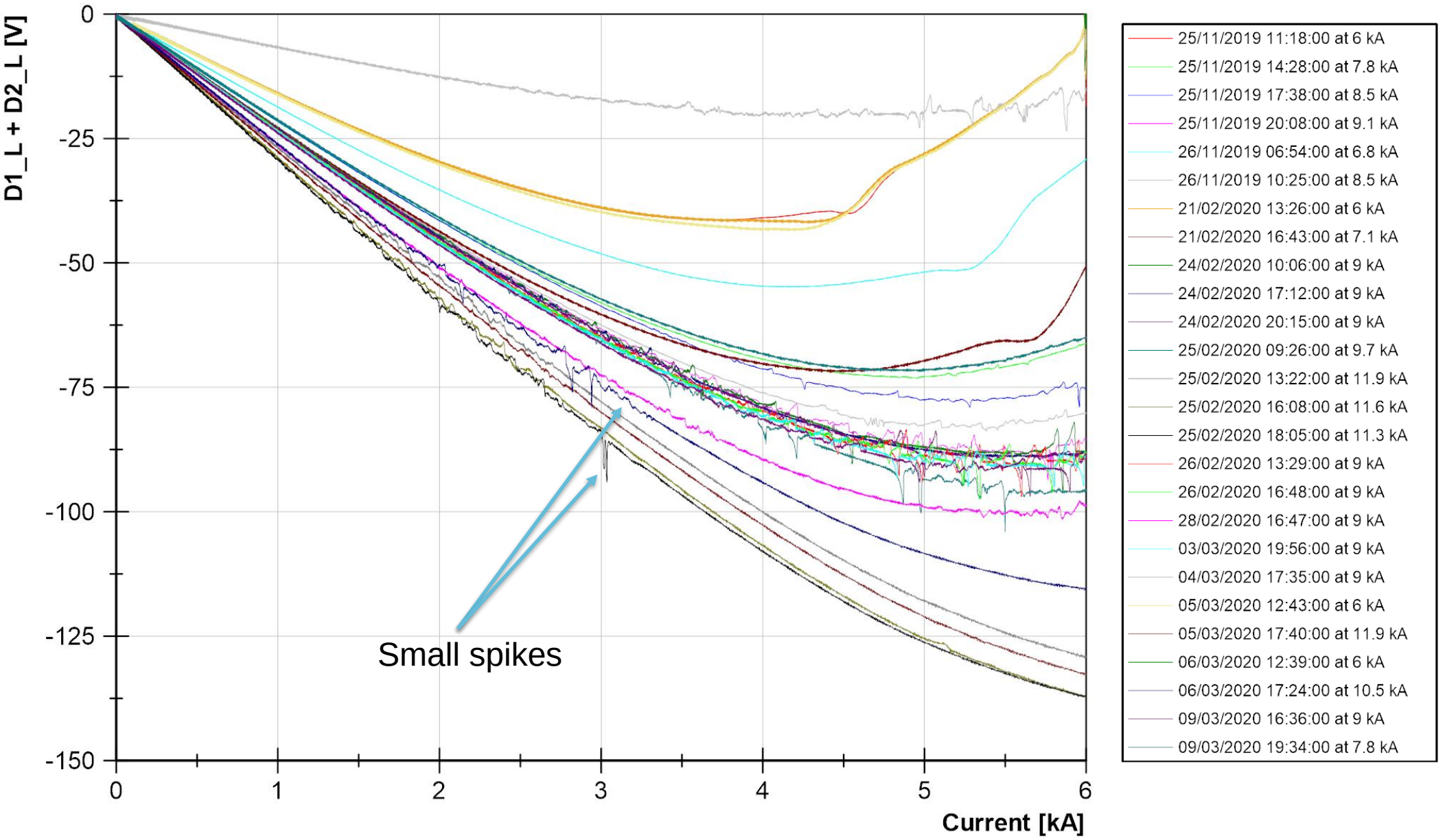


Suspected short voltage vs current



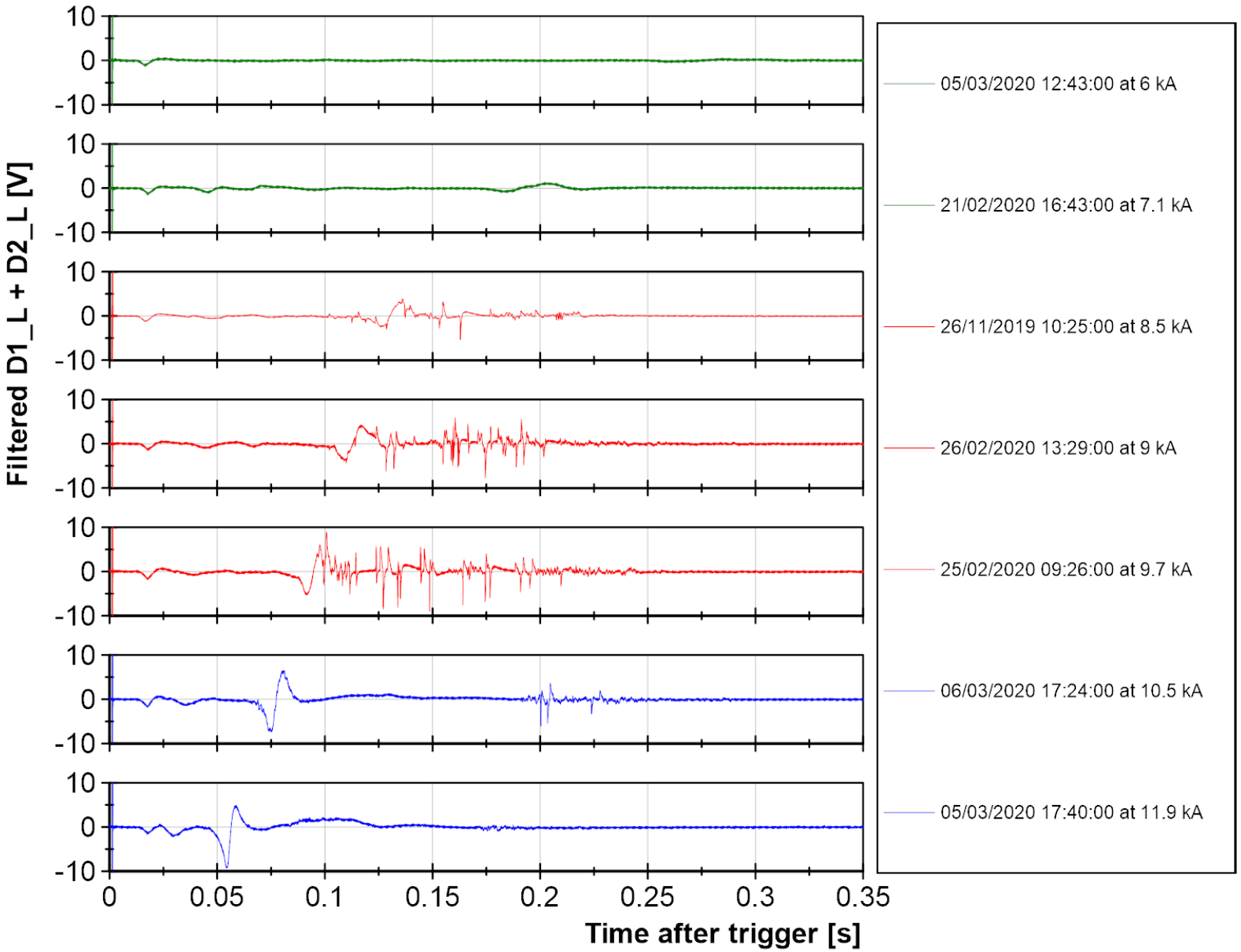
10.5-11.85 kA discharges: Spikes at high current happen near the bump

Suspected short voltage vs current



10.5-11.85 kA discharges: Spikes at low current start around 3-3.5 kA

Selected discharges at different current



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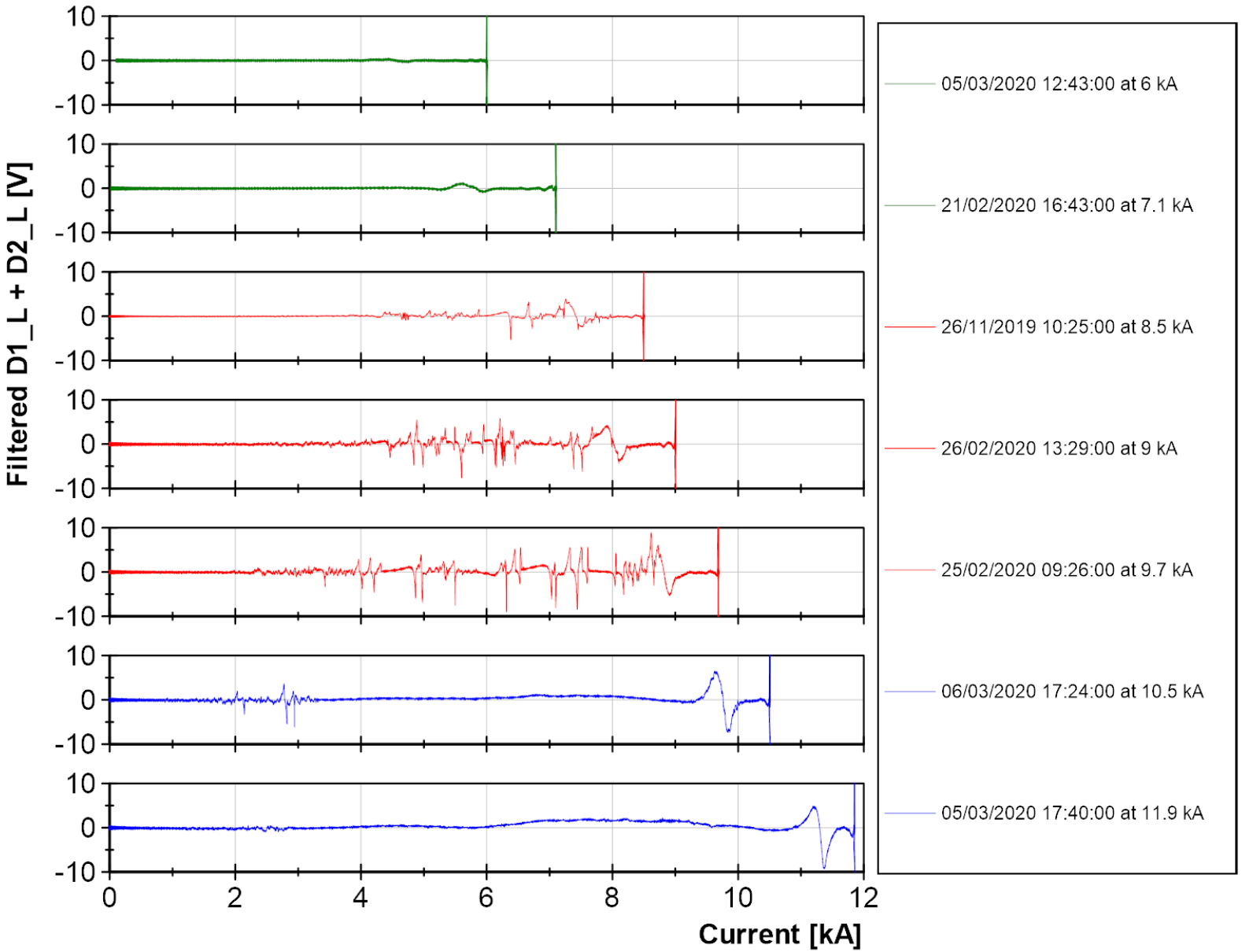

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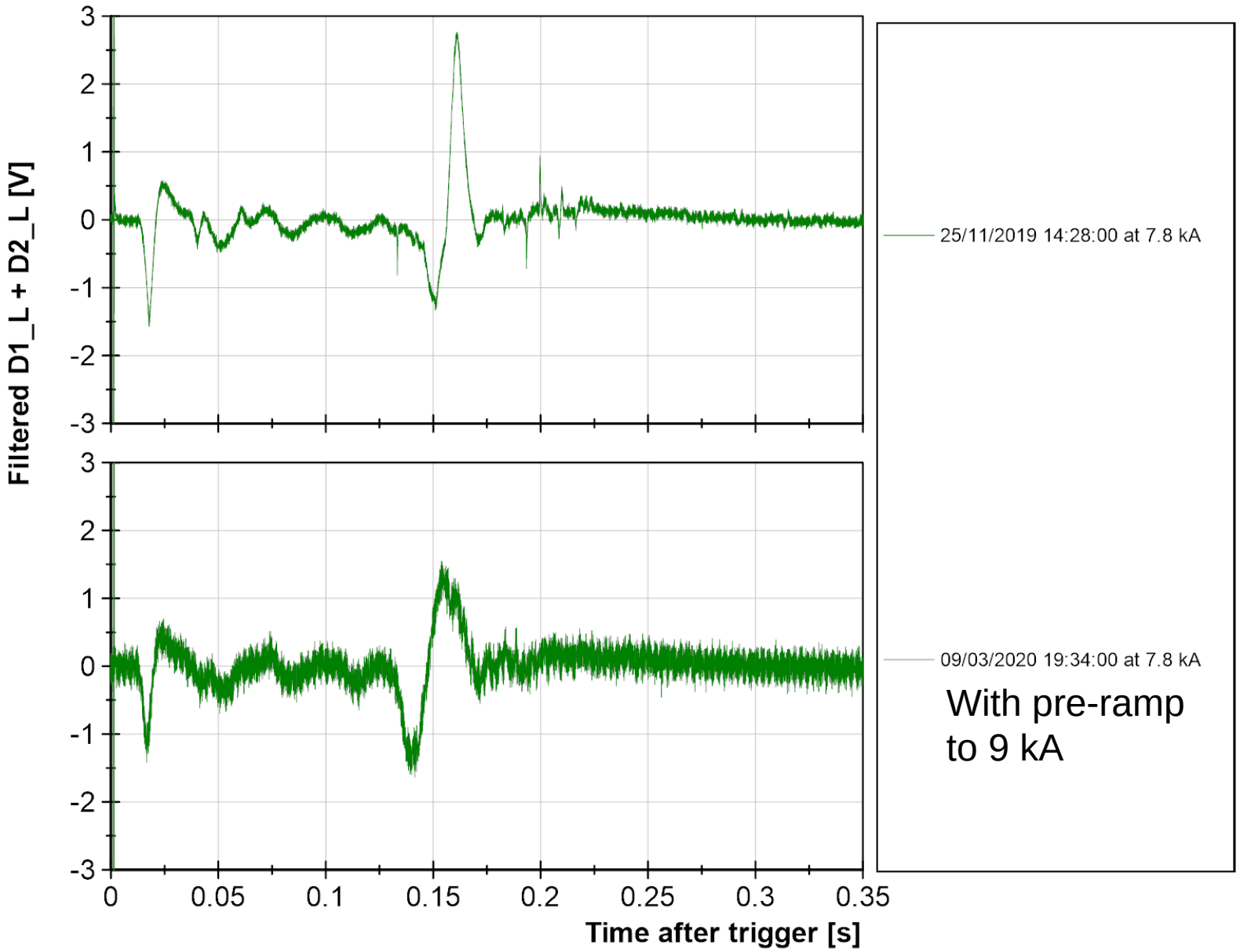
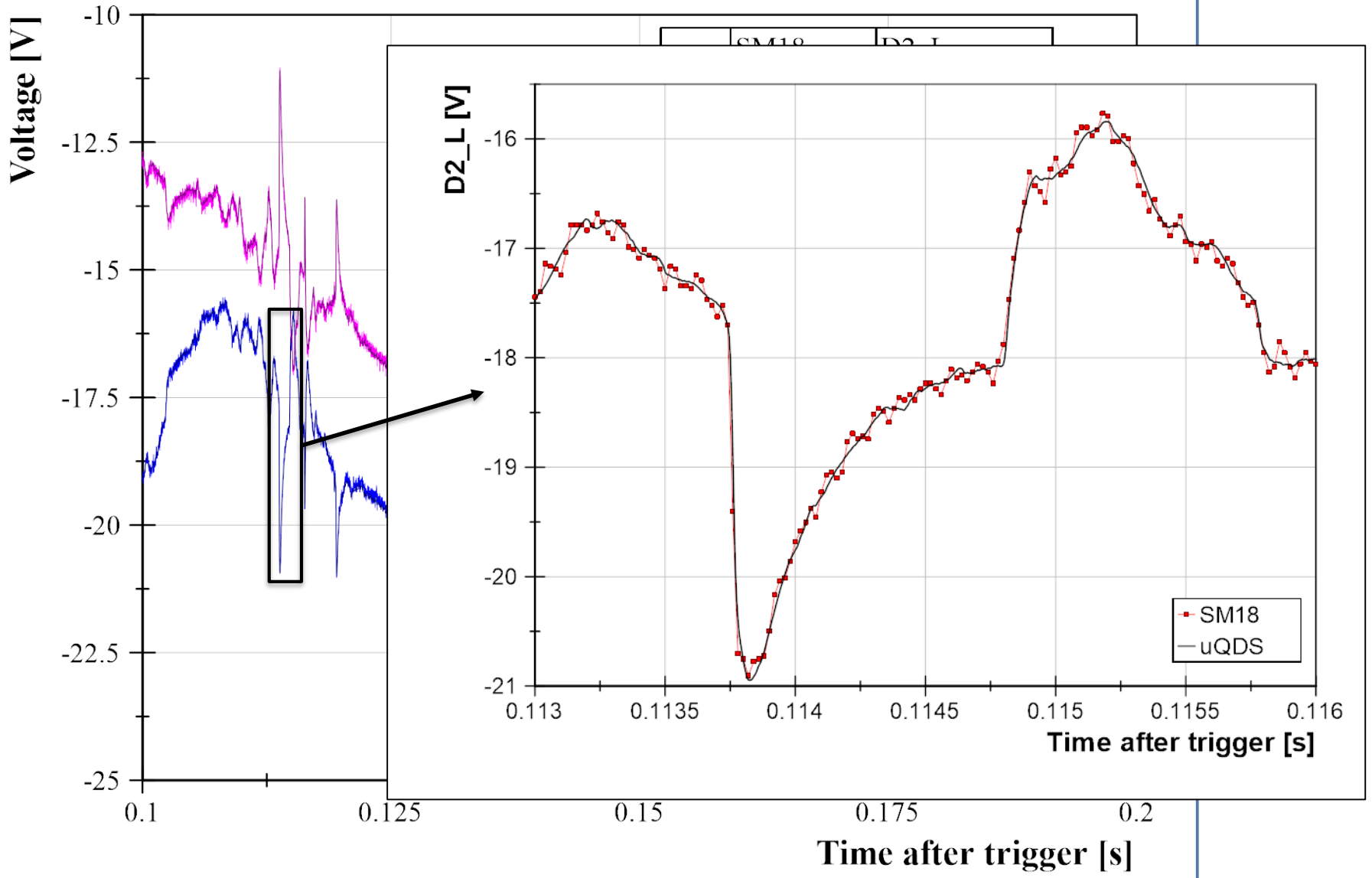
7.8 kA discharge comparison



Fewer spikes compared to November

Different bump, maybe due to different QH current? (more uniform now than in November)

uQDS and SM18 DAQ spikes



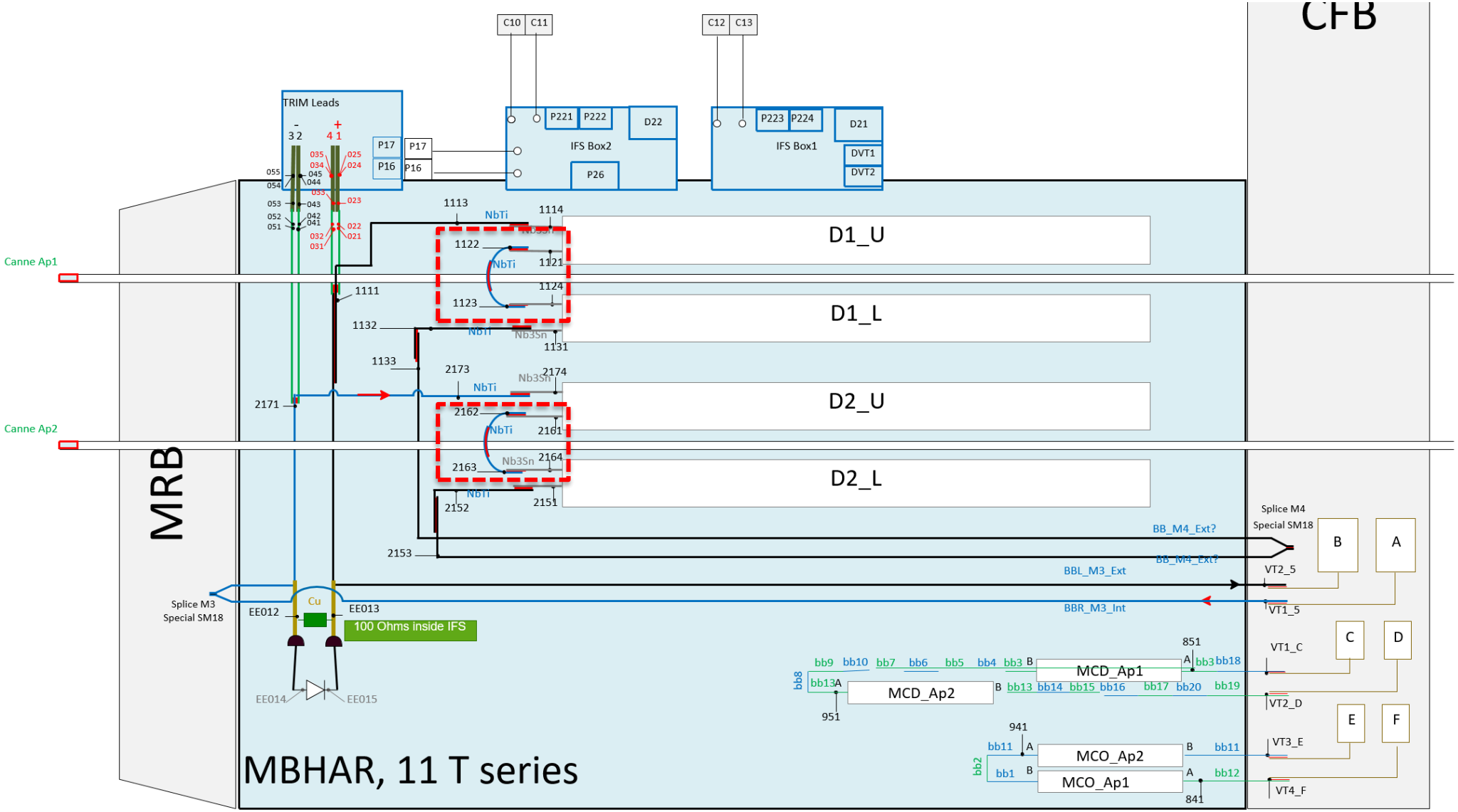
SM18 and uQDS data recorded for the 4.5 K discharge at 9 kA

SM18 data at 50 kSPS + low pass filter (~600 Hz ?)
uQDS data at 205 kSPS

Spikes are identical

Next steps

- Artificial short:
  - Buying parts (needs decision parts specification)
  - Cabling and assembly
  - Test at 1.5 kA
  - Test at 6 kA
  - Test at 9 kA
- Reflectometry & impedance
  - Now (before artificial short)
  - After 9 kA discharge


CFB
C10
C11
C12
C13
TRIM Leads
P221
P222
D22
IFS Box2
P223
P224
D21
IFS Box1
DVT1
DVT2
P17
P16
P26
Canne Ap1
Canne Ap2
D1_U
D1_L
D2_U
D2_L
NbTi
Nb3Sn
MRB
Splice M3
Special SM18
EE012
EE013
Cu
100 Ohms inside IFS
EE014
EE015
BB_M4_Ext?
BBL_M3_Ext
BBR_M3_Int
Splice M4
Special SM18
VT2_5
VT1_5
VT1_C
VT2_D
VT3_E
VT4_F
MCD_Ap1
MCD_Ap2
MCO_Ap2
MCO_Ap1
MBHAR, 11 T series