



# Update MBHA-001

## 2020-03-13

TE-MS-C-TF

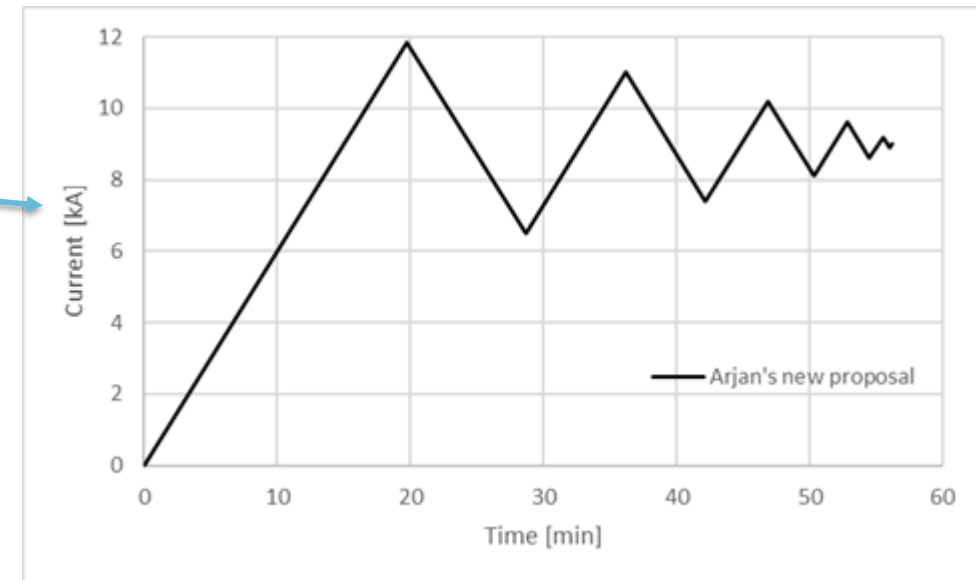
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Acknowledgements to all involved.

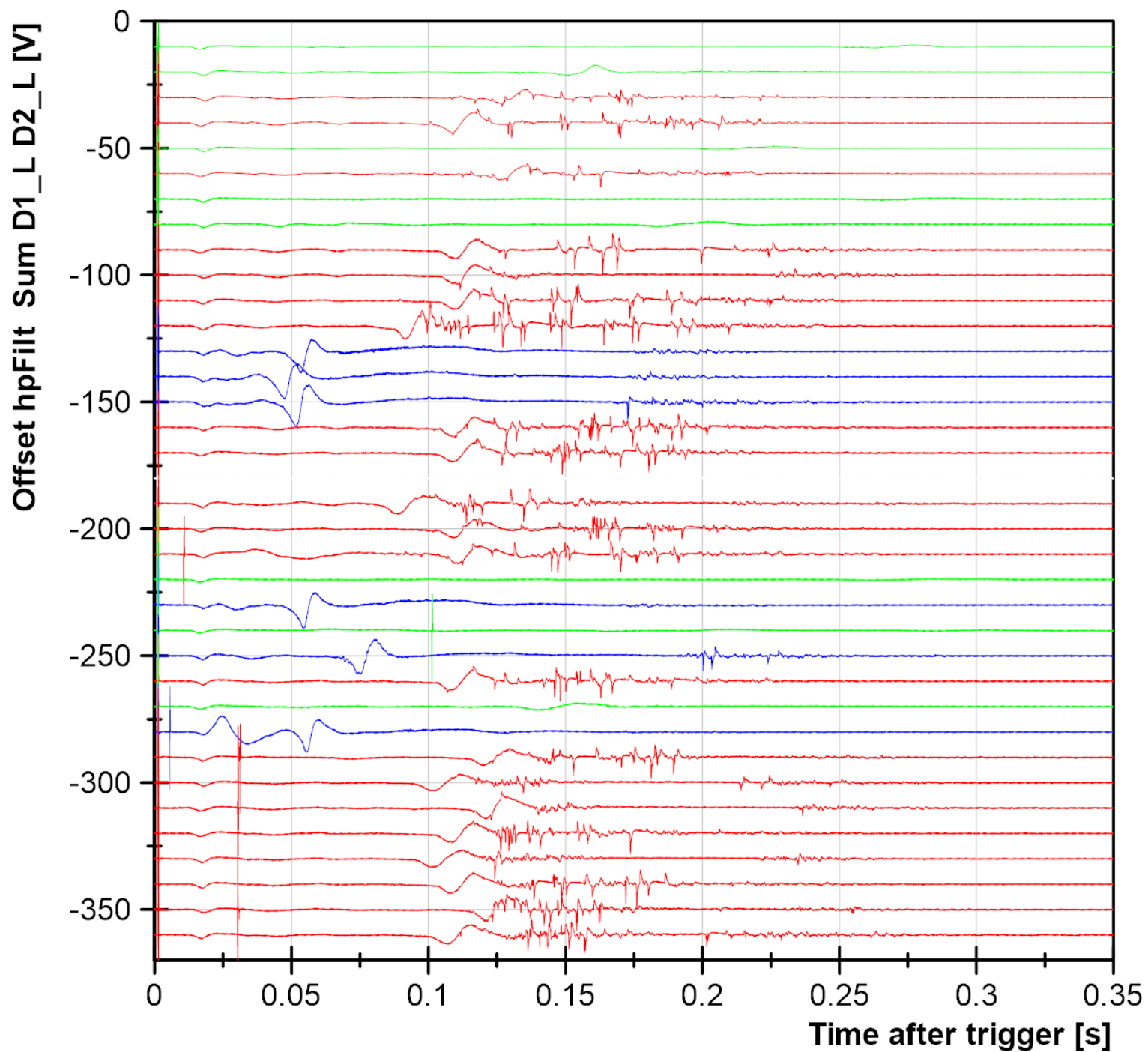


# Tests since last meeting

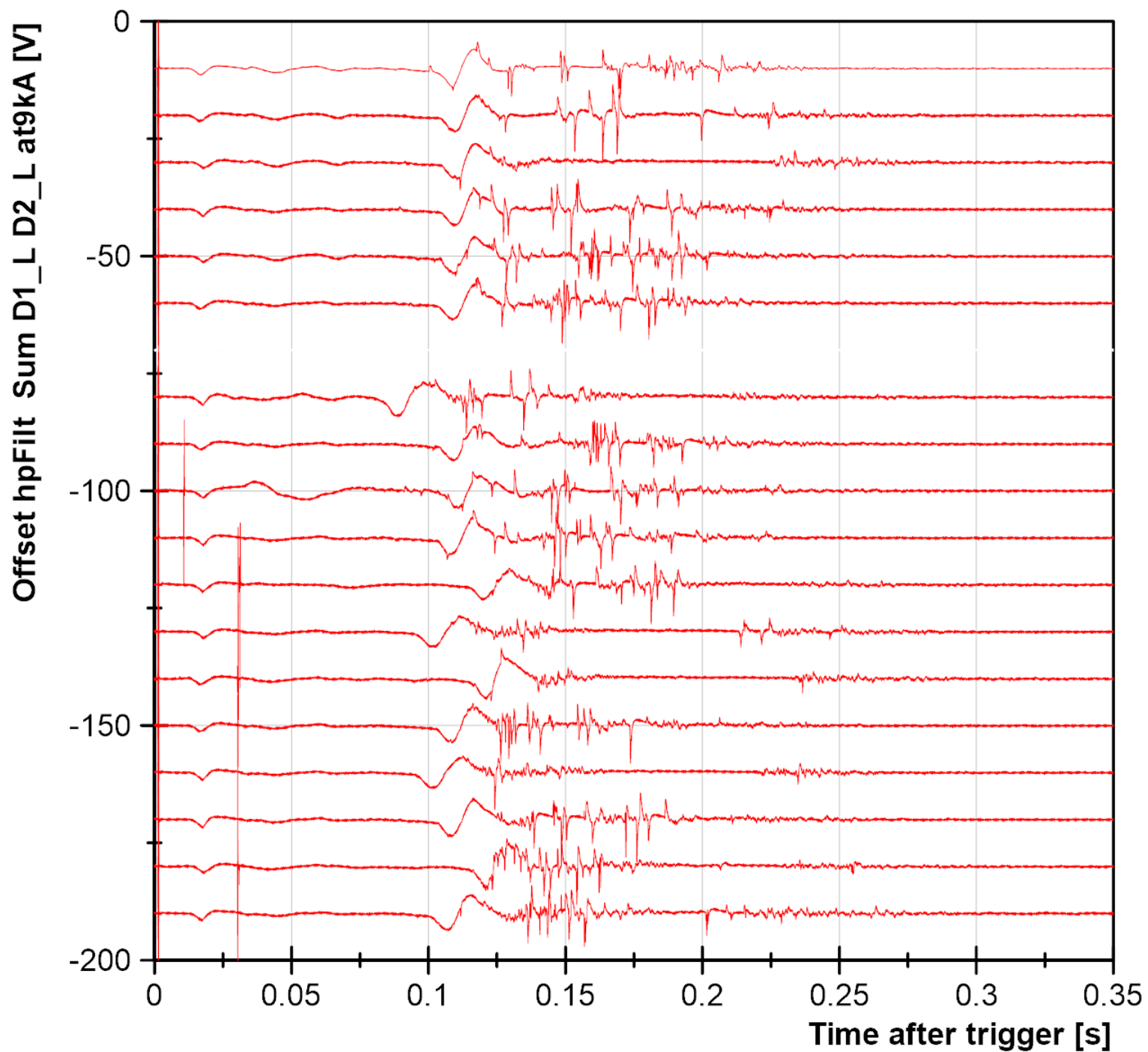
- Repeat 9 kA discharge, D2 QH delayed 30 ms
- Magnetic measurements
- Degauss
- Preparation for artificial short & impedance
- Impedance at 6 kHz
  - 1.5, 6, 9 kA (during the meeting)



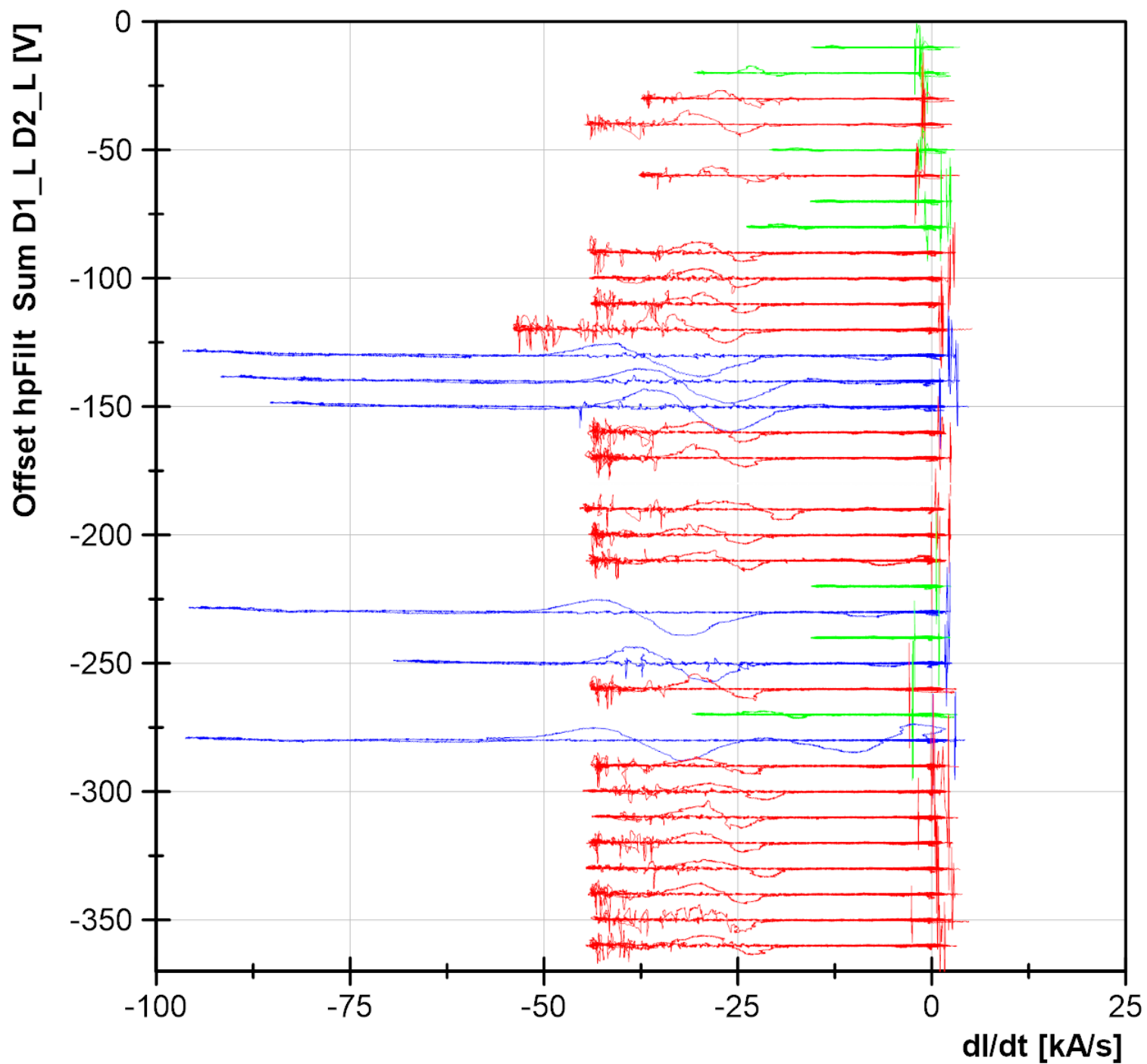
Test Date	Temp [K]	Current		Previous	History since previous Quench	Spikes category	Comment
		[kA]	QI [MA^2s]	I <sub>max</sub> [kA]			
25-11-19 11:18	1.9	6.00	10.5	6.0	6 kA splices, ramp	no	6 kA QI
25-11-19 14:28	1.9	7.83	14.7	6.0	ramp	few, small	first quench 7.8 kA
25-11-19 17:38	1.9	8.48	15.0	7.83	ramp	many, small	Quench 8.5 kA
25-11-19 20:08	1.9	9.04	15.6	8.48	ramp	many, medium	Quench 9.04 kA
26-11-19 06:54	1.9	6.77	11.9	9.04	ramp	no	Flux jump 6.8 kA
26-11-19 10:25	1.9	8.50	13.1	8.50	8.5 kA SPA, ramp	many, medium	Discharge 8.5 kA
21-02-20 13:26	1.9	6.00	11.1	6.00	6 kA splices, ramp	no	6 kA QI
21-02-20 16:43	1.9	7.10	12.0	6.00	VI ramp	no	7100 A QPS check - 2 heaters fired - detection of the quench within 3 ms by QPS
24-02-20 10:06	1.9	9.00	13.3	7.10	VI ramp	many, large	Discharge at 9kA
24-02-20 17:12	1.9	9.00	13.3	9.00	1.5 kA discharge, 200 A FJ, VI ramp	many, small	Discharge at 9kA
24-02-20 20:15	1.9	9.00	13.3	9.00	VI ramp	many, large	Discharge at 9kA
25-02-20 09:26	1.9	9.69	15.6	9.00	VI ramp	many, large	Training quench 9.7 kA
25-02-20 13:22	1.9	11.85	14.3	11.95	VI ramp to 11.95 kA, ramp	many, small, late	Discharge at nominal current (11.85 kA)
25-02-20 16:08	4.5	11.57	14.9	11.85	VI ramp	many, small, late	QUENCH 11.57 kA 4.5K
25-02-20 18:05	4.5	11.25	14.6	11.57	VI ramp	many, small, late	QUENCH 11.25 kA 4.5K Small precursor 4ms before quench
26-02-20 13:29	1.9	9.00	13.2	11.95	VI ramp to 11.95 kA, ramp to 200 A, VI ramp	many, large	Discharge at 9kA
26-02-20 16:48	1.9	9.00	13.2	9.00	VI ramp	many, large	Discharge at 9kA
28-02-20 11:42	1.9	9.00	13.3	9.00	1.5 kA discharge, ramp		Discharge at 9kA only QPS connected to IFS
28-02-20 16:47	4.5	9.00	12.6	9.00	1.5 kA discharge, VI ramp to 11.5 kA, ramp	many, large	Discharge at 9kA (4.5K)
03-03-20 19:56	1.9	9.00	13.2	9.00	12h holding 11.85 kA, 50 A/s to 11.85 kA, 50 A/s to 0, [timber down]	many, large	Discharge at 9kA with extra potaim crate to measure Qloc and single splices
04-03-20 17:35	1.9	9.00	13.4	9.00	[timber down]	many, large	Discharge at 9kA with QH D1_U delayed 10ms
05-03-20 12:43	1.9	6.00	11.1	9.00	[timber down]	no	Discharge at 6kA
05-03-20 17:40	1.9	11.85	14.3	6.00	[timber down]	very small, late	Discharge at 11850A
06-03-20 12:39	1.9	6.00	11.8	11.85	ramp	no	Discharge at 6 kA. D1U QH delayed 100 ms
06-03-20 17:24	1.9	10.50	14.0	6.00	ramp	many, medium, late	Discharge at 10.5 kA
09-03-20 16:36	1.9	9.00	13.3	11.85	50 A/s to 11.85 kA and SPA, ramp	many, large	Discharge at 9kA. QH polarity inversed
09-03-20 19:34	1.9	7.80	10.7	9.00	200 A FJ, ramp to 9 kA, ramp	no	Ramp up to 9kA then provoked quench at 7.8kA
10-03-20 11:09	1.9	11.85	14.6	7.80	ramp	very small, late	Discharge at 11.5 kA with D1U delayed by 5 ms
10-03-20 15:03	1.9	9.00	14.3	11.85	QH firing at 0 A, ramp	many, large	Discharge at 9 kA with D1U and D1L QH delayed 30 ms
10-03-20 18:03	1.9	9.00	13.3	9.00	ramp to 11.85 kA, ramp	many, medium, empty window	Ramp to 11.85 kA then discharge at 9 kA
11-03-20 09:05	1.9	9.00	14.3	9.00	QH firing at 0 A, ramp	many, medium, empty window	Discharge at 9 kA with D2L and D2U QH delayed 30 ms
11-03-20 13:14	1.9	9.00	13.3	9.00	amp	many, large	Discharge @9kA
11-03-20 15:52	1.9	9.00	13.3	9.00	ramp to 11.85 kA, ramp	many, medium, empty window	Discharge at 9 kA with pre-ramp at 11.85 kA
11-03-20 19:07	1.9	9.00	13.3	9.00	ramp to 11.85 kA, ramp to 50 A, ramp	many, large	Discharge @9kA after Vshape cycle up to nominal
12-03-20 10:12	1.9	9.00	14.3	9.00	QH firing at 0 A, ramp	many, large	Discharge at 9 kA with D2U and D2L QH delayed 30 ms
12-03-20 16:33	1.9	9.00	13.4	9.00	magnetic measurement, degauss cycle to 11.85 kA	many, large	9kA discharge after degauss cycle
13-03-20 12:30	1.9	6.00	11.1	9.00	1 kA discharge, ramp		6 kA discharge with impedance measurement at 6 kHz



- Discharge at 6 kA
- first quench
- Discharge at 8.5 kA
- Discharge at 9 kA
- Flux jump
- Discharge at 8.5 kA
- 6 kA QI
- 7100 A QPS check - 2 heaters fired - detection of the quench within 3 ms by Q
- Discharge at 9kA
- Discharge at 9kA
- Discharge at 9kA
- Training quench 1
- Discharge at nominal current (11.85 kA)
- QUENCH 2 4.5K
- QUENCH 3 4.5K Small precursor 4ms before quench
- Discharge at 9kA
- Discharge at 9kA
- Discharge at 9kA only QPS connected to IFS
- Discharge at 9kA (4.5K)
- Discharge at 9kA with extra potaim crate to measure Qloc and single splices
- Discharge at 9kA with QH D1\_U delayed 10ms
- Discharge at 6kA
- Discharge at 11850A
- Discharge at 6 kA. D1U QH delayed 100 ms
- Discharge at 10.5 kA
- Discharge at 9kA. QH polarity inverted
- Ramp up to 9kA then provoked quench at 7.8kA
- Discharge at 11.5 kA with D1U delayed by 5 ms
- Discharge at 9 kA with D1U and D1L QH delayed 30 ms
- Ramp to 11.85 kA then discharge at 9 kA
- Discharge at 9 kA with D2L and D2U QH delayed 30 ms
- Discharge @9kA
- Discharge at 9 kA with pre-ramp at 11.85 kA
- Discharge @9kA after Vshape cycle up to nominal
- Discharge at 9 kA with D2U and D2L QH delayed 30 ms
- 9kA discharge after degauss cycle



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- Discharge at 9kA only QPS connected to IFS
- Discharge at 9kA (4.5K)
- Discharge at 9kA with extra potaim crate to measure Qloc and single splices
- Discharge at 9kA with QH D1\_U delayed 10ms
- Discharge at 9kA. QH polarity inverted
- Discharge at 9 kA with D1U and D1L QH delayed 30 ms
- Ramp to 11.85 kA then discharge at 9 kA
- Discharge at 9 kA with D2L and D2U QH delayed 30 ms
- Discharge @9kA
- Discharge at 9 kA with pre-ramp at 11.85 kA
- Discharge @9kA after Vshape cycle up to nominal
- Discharge at 9 kA with D2U and D2L QH delayed 30 ms
- 9kA discharge after degauss cycle



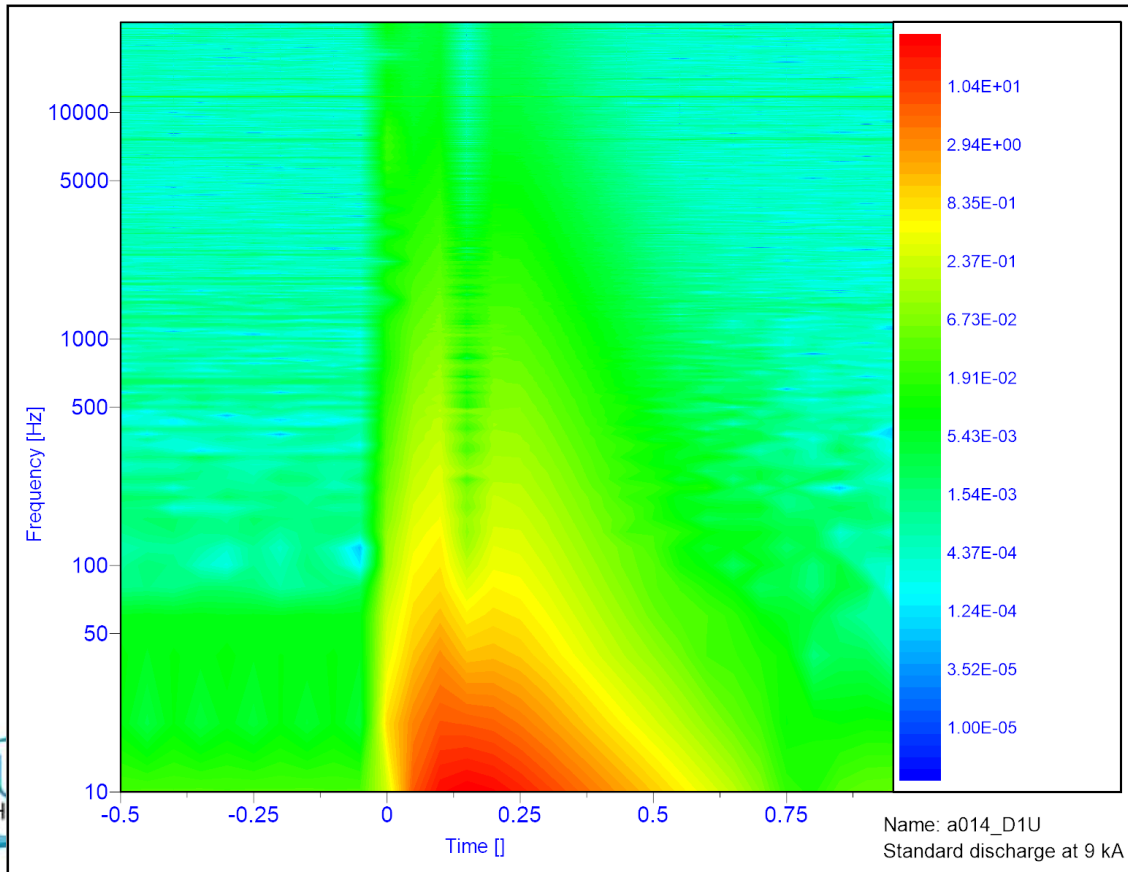
- Discharge at 6 kA
- first quench
- Discharge at 8.5 kA
- Discharge at 9 kA
- Flux jump
- Discharge at 8.5 kA
- 6 kA QI
- 7100 A QPS check - 2 heaters fired - detection of the quench within 3 ms by Q
- Discharge at 9kA
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- Discharge at 6kA
- Discharge at 11850A
- Discharge at 6 kA. D1U QH delayed 100 ms
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- Discharge at 9 kA with D1U and D1L QH delayed 30 ms
- Ramp to 11.85 kA then discharge at 9 kA
- Discharge at 9 kA with D2L and D2U QH delayed 30 ms
- Discharge @9kA
- Discharge at 9 kA with pre-ramp at 11.85 kA
- Discharge @9kA after Vshape cycle up to nominal
- Discharge at 9 kA with D2U and D2L QH delayed 30 ms
- 9kA discharge after degauss cycle



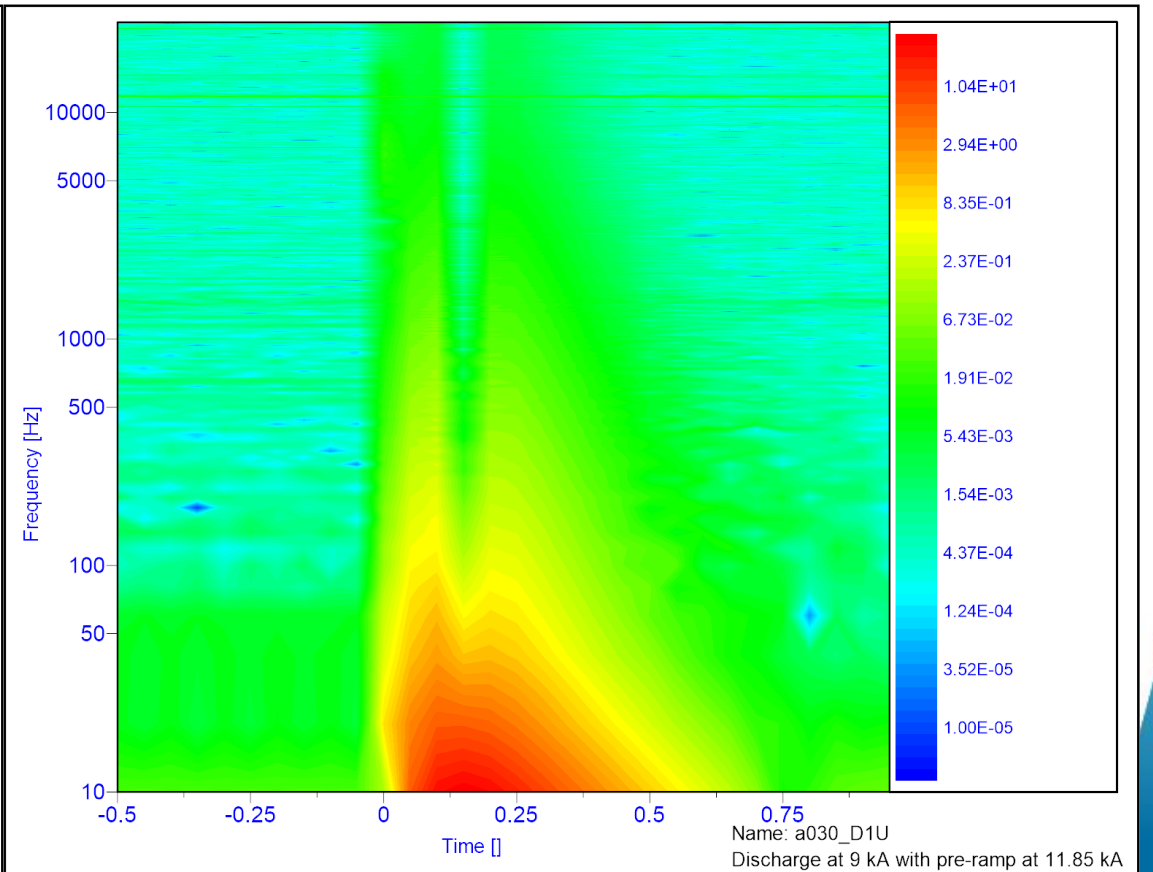
# Short time FFT

Signal: D1U. A series of 30 FFTs, every 50 ms, without any overlap  
Color is amplitude of FFT, in log scale. Both plots have the same scales

Standard 9 kA discharge



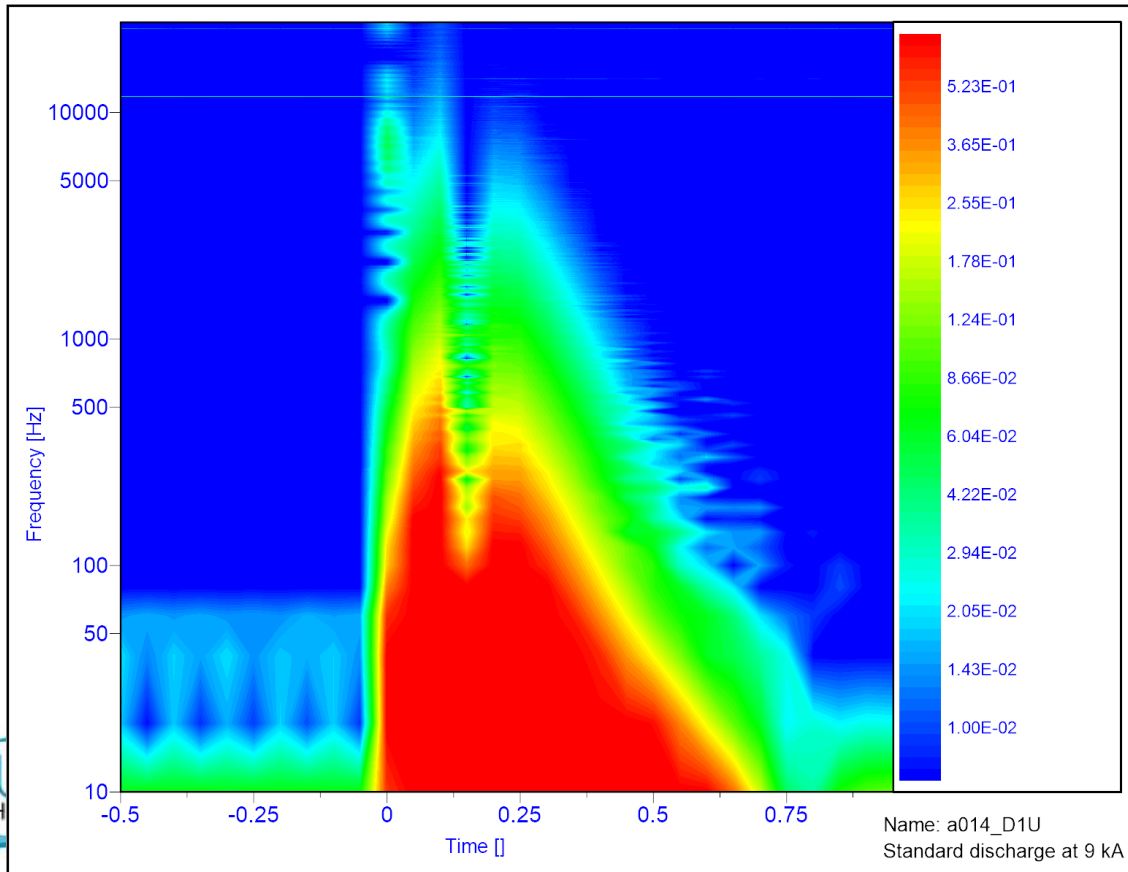
Pre-ramp to 11.85 kA, 9 kA discharge



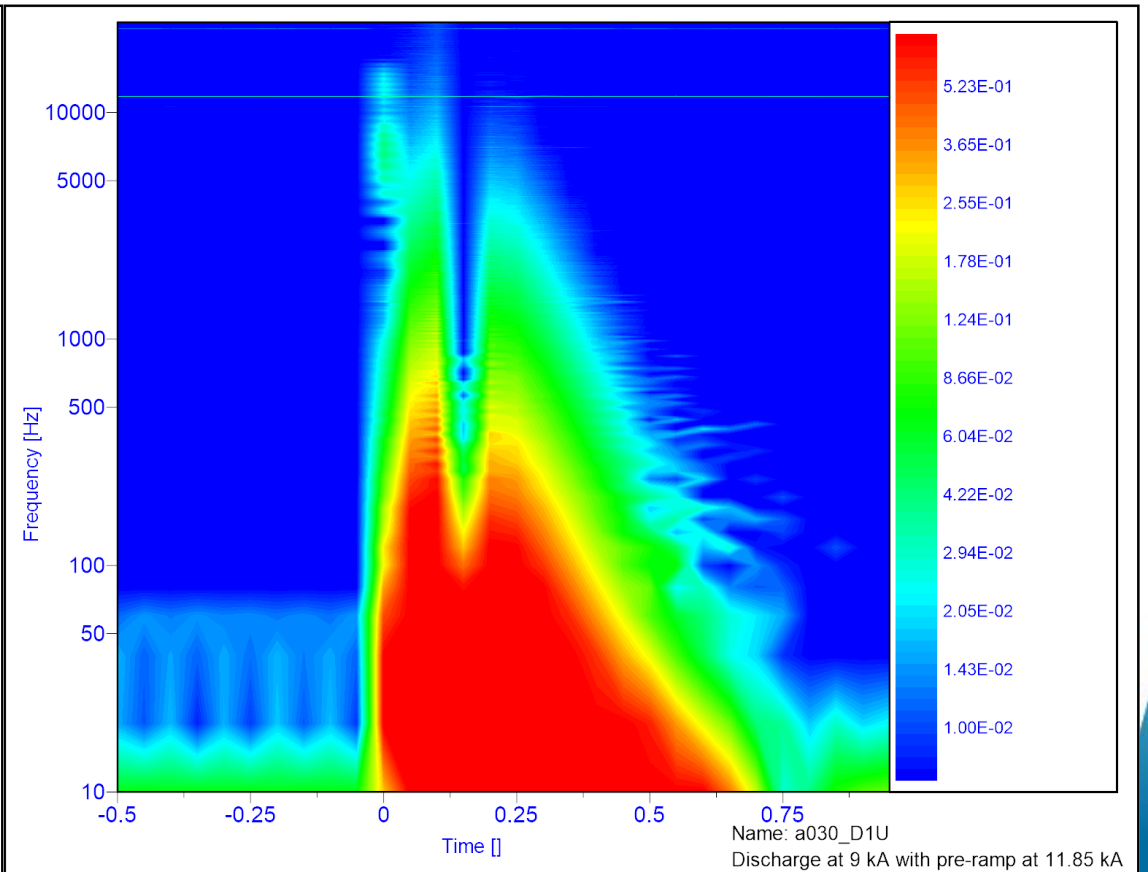
# Short time FFT

Signal: D1U. A series of 30 FFTs, every 50 ms, without any overlap  
Color is amplitude of FFT, in log scale. Both plots have the same scales

Standard 9 kA discharge



Pre-ramp to 11.85 kA, 9 kA discharge





# Next steps

- Monday:
  - Artificial short test with 100 Ohm, at 1.5, 6, 9 kA
  - At 4.5 K: ramp to 9 kA and discharge
- Tuesday
  - HV test
  - Warmup (thermal cycle)
    - RRR measurement until transition,
    - Impedance measurement from 20K to RT
- Wednesday: next meeting

