MD#4147
50Hz harmonics perturbation

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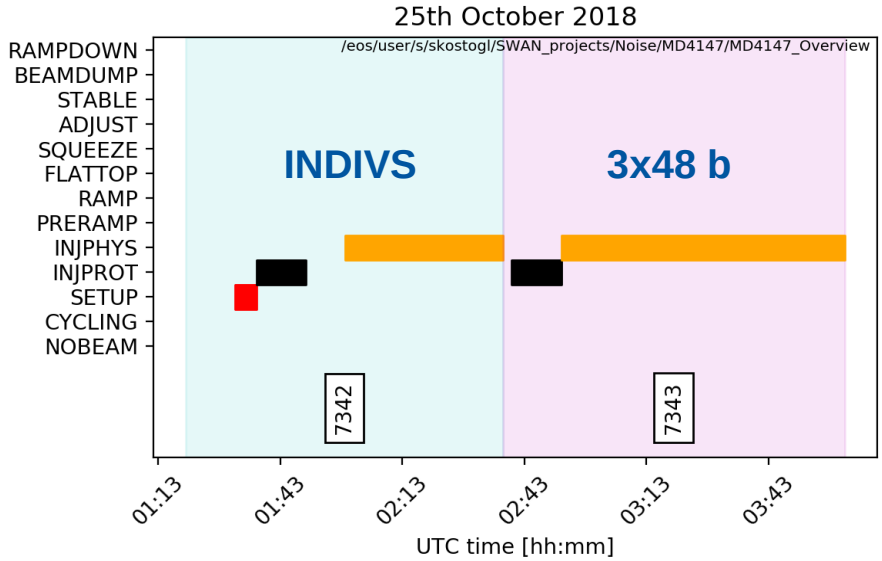
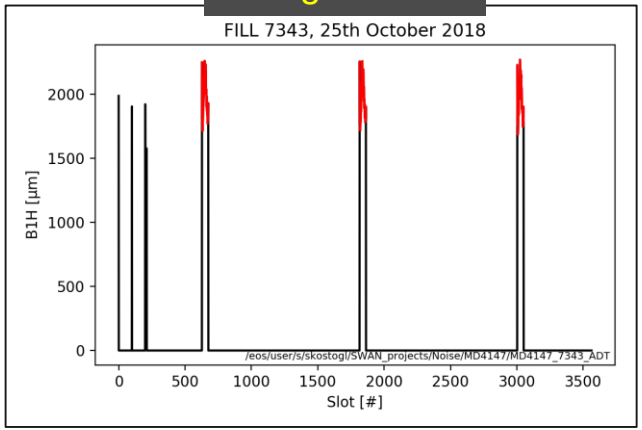
MD#4147 Overview

Motivation: Investigate the source of the 50 Hz harmonics at injection & study if there is an impact on the beam performance. (MD#4, 4h+1h)



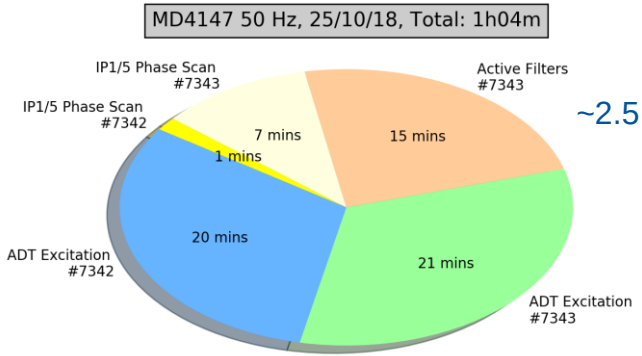
Filling scheme



- Trains with 120 degrees phase difference for constant sampling rate

MD#4147 Overview

1. **ADT excitations** to validate lifetime simulations with voltage ripples. ☑
2. **Active filters** of the MB sector by sector. ☑
3. **IP1/5 phase scan** ± 40 degrees. ☑ (± 8 degrees)
4. **Tune scan** to closest 50 Hz harmonics. ☒
5. Investigate if there is also a **tune modulation** with 50 Hz. ☒



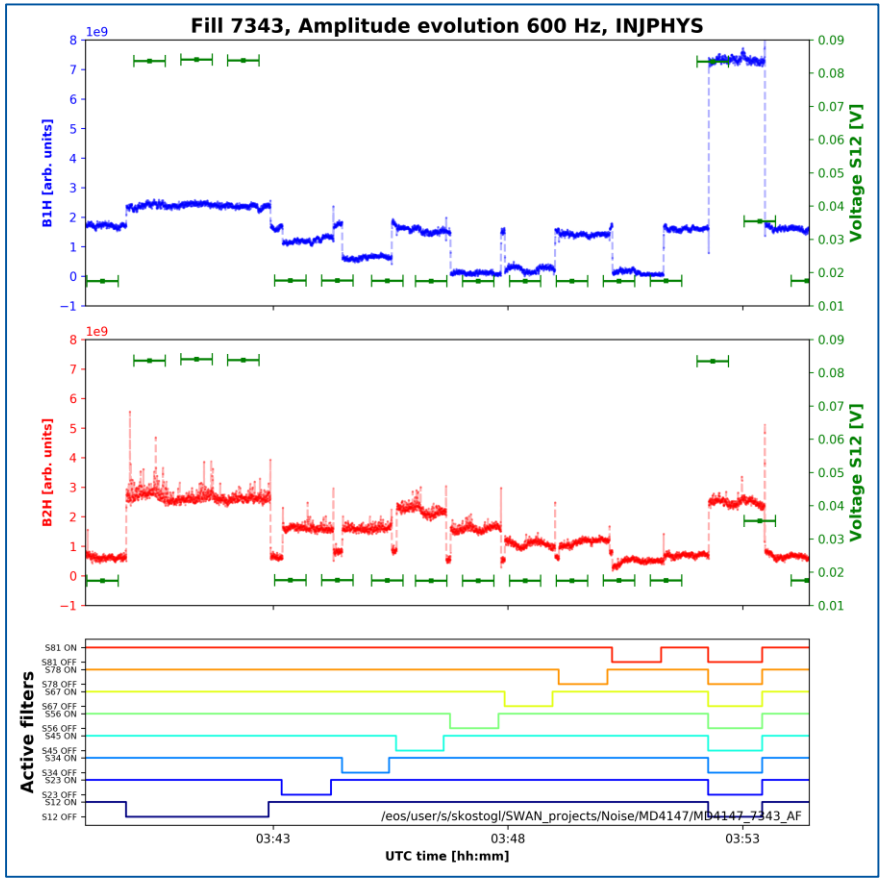
~2.5 h delay

Observables

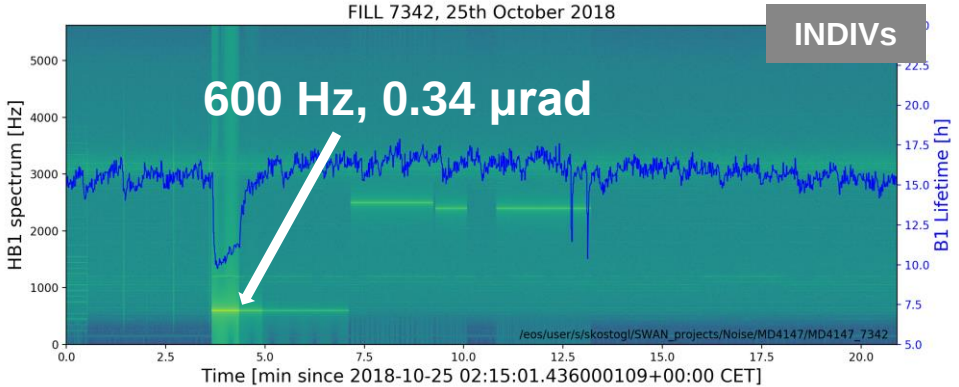
✓	ADTObsBox	Only for 12b for AF and IP1/5 phase scan. All trains for ADT excitations
✓	BBQ	
×	MIM	
✓	Head-Tail	Only pm
✓	DOROS	For multiple PUs DOS & DOR every 1 minute
✓	Schottky	
✓	BSRT	
✓	Power converter S12	Acquisition set to 1 minute

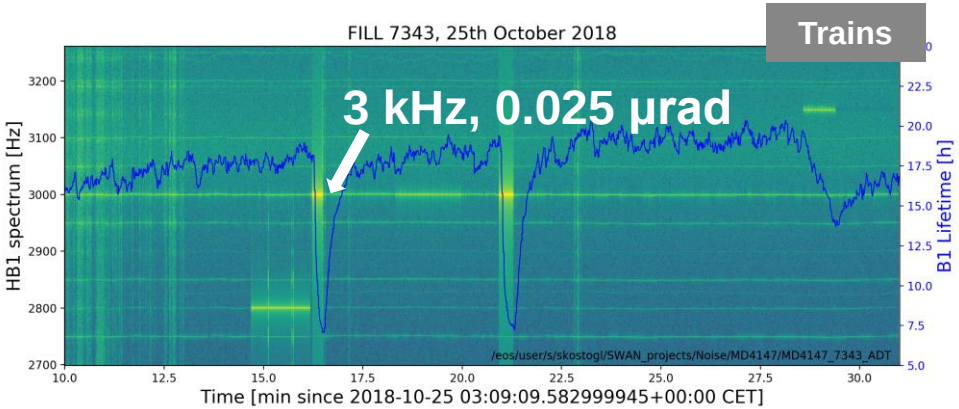
Active filters

- Response map of each sector.
- Different for B1 & B2, for different harmonics, for injection & flattop.
- Compatible with the power converter S12 spectrum.
- **Phase component of each sector to be defined.**

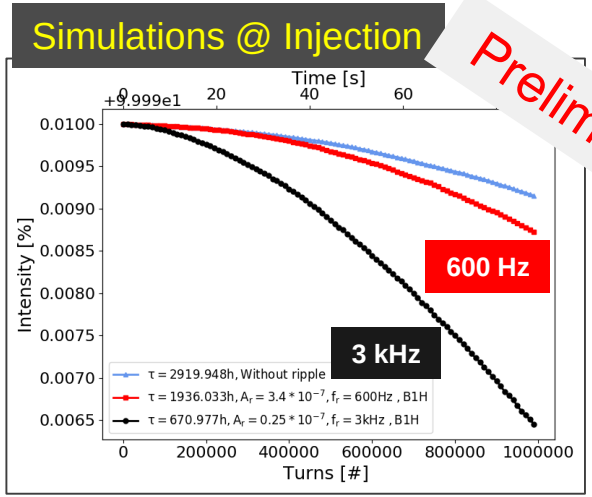


ADT excitations





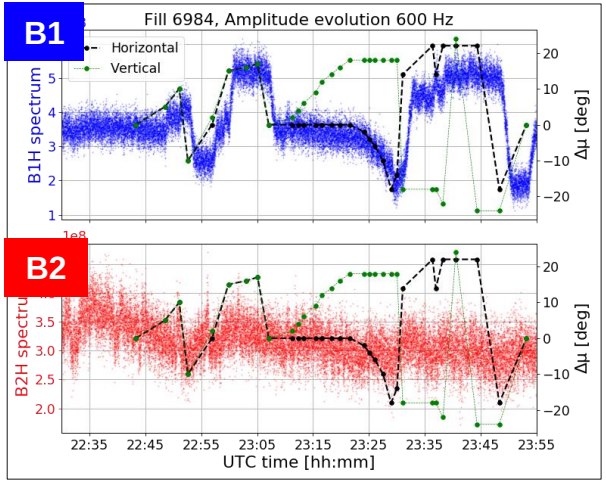
Lifetime		
fr [Hz]	MD	Simulations
600	-37.5%	-33.69
3000	-60.5%	-77.02%



IP1/5 Phase Scan

During MD#2 FT

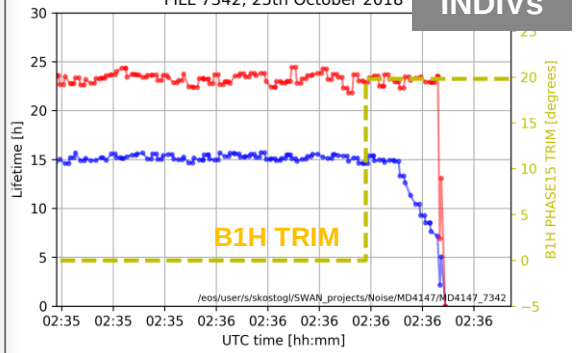
- No impact in lifetime
- Change in amplitude evolution of 50 Hz



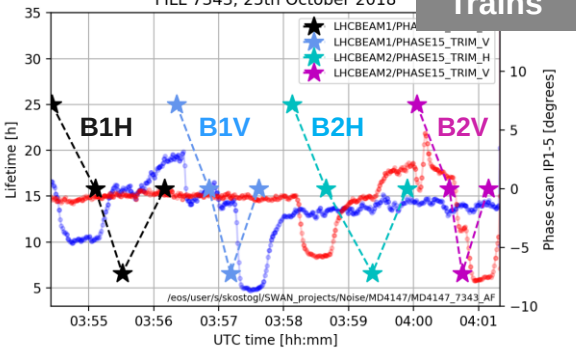
During MD#4 INJ

- Impact on lifetime at injection:
  - At +20 degrees with INDIVs.
  - Degradation or improvement even at 8 degrees.
  - No change in the 50 Hz amplitude evolution.

INDIVs



Trains



Conclusions

- MD started with a 2.5 h delay due to RF problem.
- We now have a response matrix of the active filters sector by sector both at injection and top energy. Ongoing studies for the determination of the phase component of each sector.
- Excitations with ADT have provided a metric of the impact on lifetime from dipolar excitations close and far away from the tune.
- We did not manage to reproduce the change of amplitude of the 50 Hz harmonics with the IP1/5 phase knob at injection (losses after 8 degrees). Investigation on the lifetime variation during the change of IP1/5 phase advance.