

SRF cavity operation at the European XFEL.

Jan Timm, Ayla Nawaz
Hamburg 22.2.2019

Self Introduction.

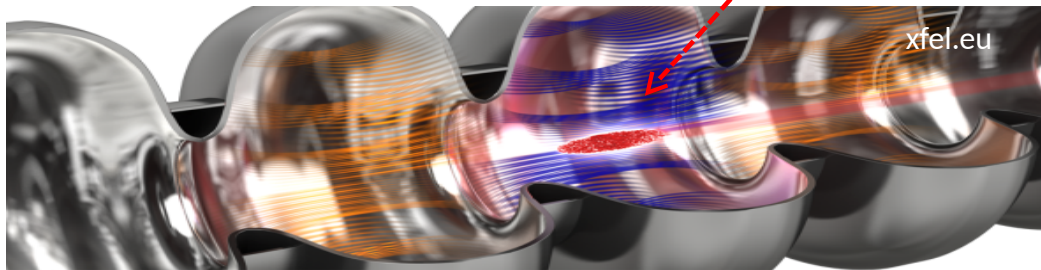
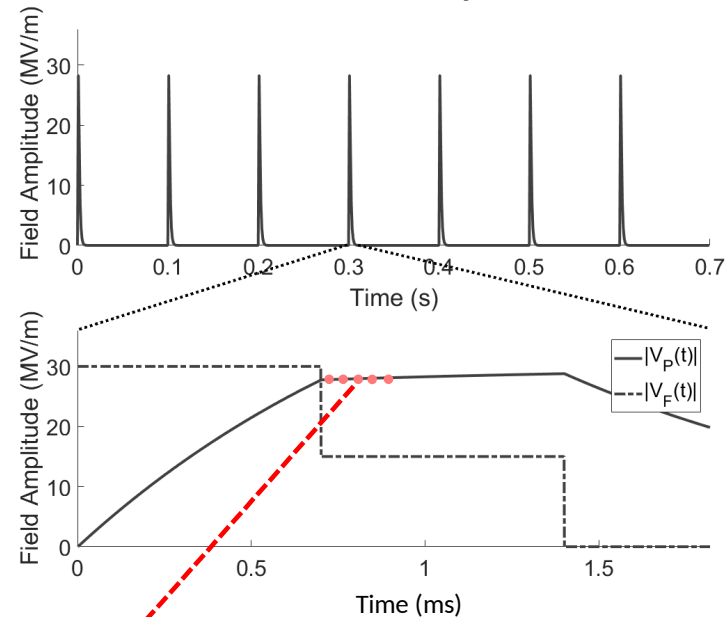
Jan Timm

- **New at MSK since August 2018**
- **But I'm just getting started, I was in parental leave for 4 months**
- **I have done before... Gamma and X-ray spectroscopy**
 - **COBRA Experiment**
 - **Neutrinoless double beta decay**
 - **Pulse shape analysis of coplanar grid CdZnTe detectors**
 - **MC simulations on neutron transport and coincidence analysis**
 - **DAQ System for energy dispersive detectors based on MicroTCA.4**
 - **Collaboration between MSK and PETRA III Ext/P24**
 - **Moving Pulse shape trigger, digitally based connecting CFD with energy reconstruction**
 - **Firmware and software**
 - **High energy resolution at high count rates**
 - **In principle for all detector types**
 - **Hans-Thomas Duhme: DRTM-AMP10**

SRF cavity operation at the European XFEL

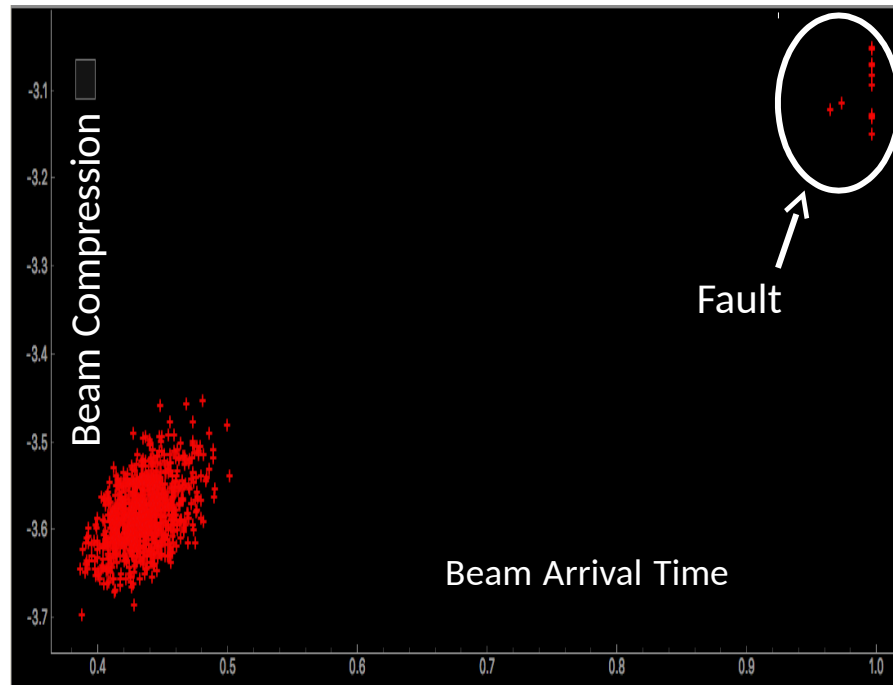
- 808 superconducting cavities
- 10 pulses per second
- ~ 700 Million pulses a day
- 1.5 GB/s data from EM field measurements

Pulsed mode operation



Overall aim

- Decrease downtimes
- Predict problems
- Monitor overall performance



General Conditions

- Online and Offline analysis
- For every cavity we need forward, reflected and probe signal (ampl., phase) and some other values
- Based on ChimeraTK::ApplicationCore
→ and the other big goal:
- Looking at other channels, detecting trips and providing the data for a GUI,
“Trip Event Logger”

Getting data

Online

- ChimeraTK, DeviceAccess with DOOCs backend
- Macropulse consistencies is not given jet

Offline

- DAQ snapshot data
- To access data from .raw files in C/C++, you need user_test tool and a .xml file
- Converter to hdf5

Data analysis

- MATLAB generated C code
 - Is too slow
 - Implement cavity analysis by hand
 - alpaka - Abstraction Library for Parallel Kernel Acceleration (running CPU, GPU, FPGA?)
- Need to deal with 'Big Data',
but also with 'Fast Processing'