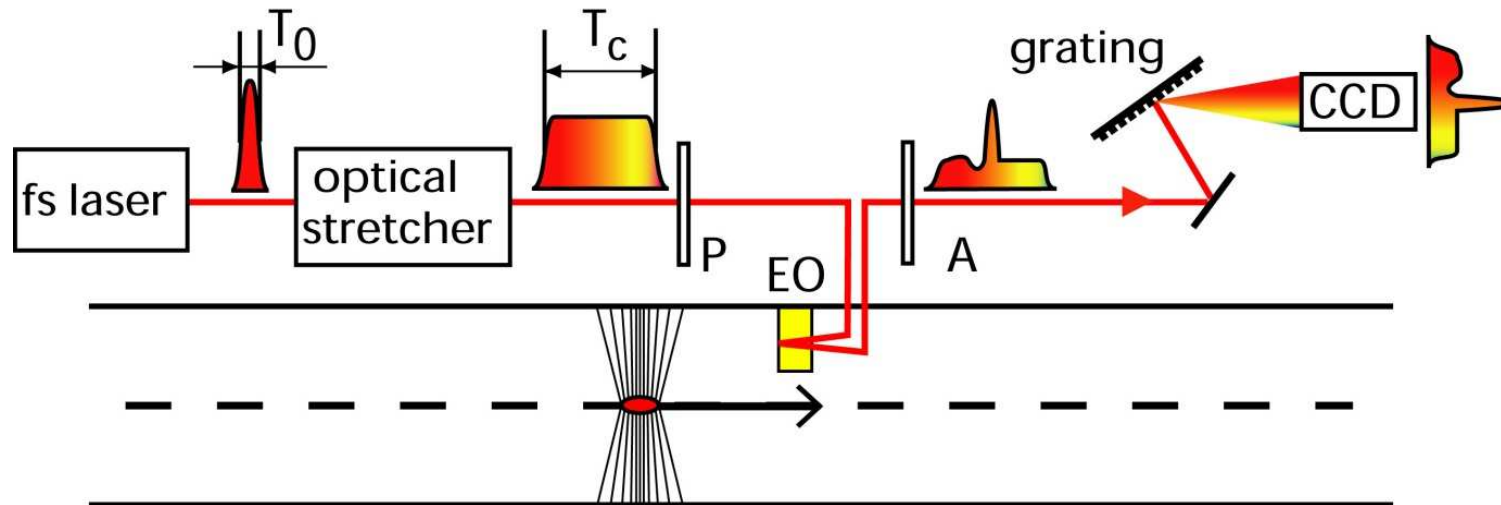
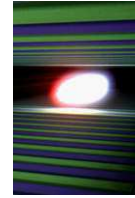


# Electro-Optical bunch length Detection at the E-XFEL

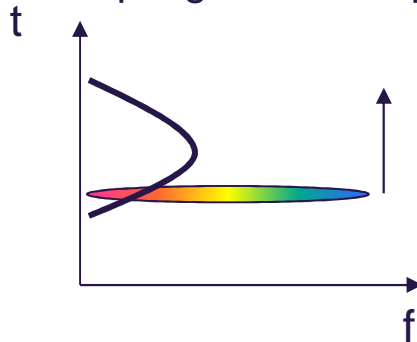
Bernd Steffen, July 2017



# Electro-Optical bunch Detection / Electro-optical Spectral Decoding

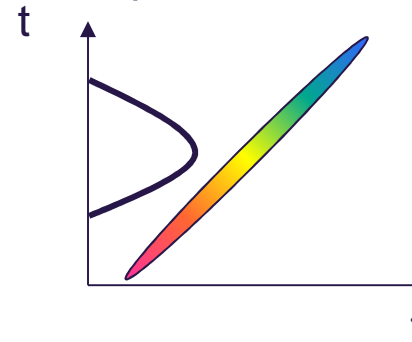


Sampling with laser pulse:



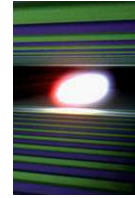
→ Sample electron bunch  
with many laser pulses

Chirped laser pulse:

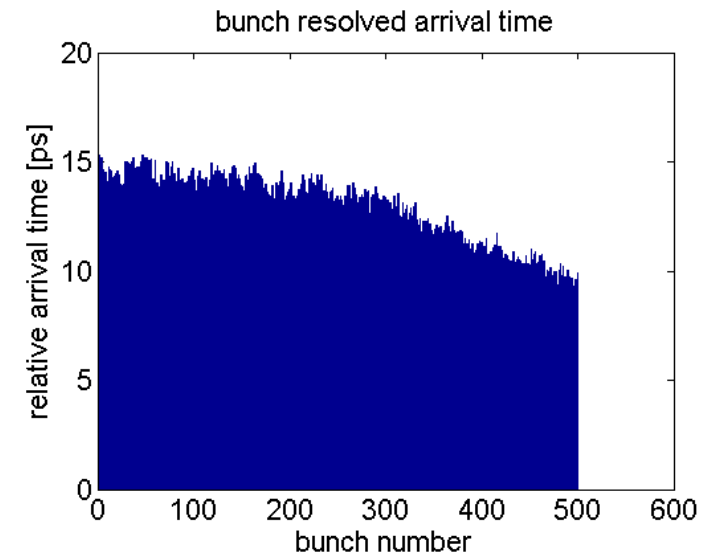
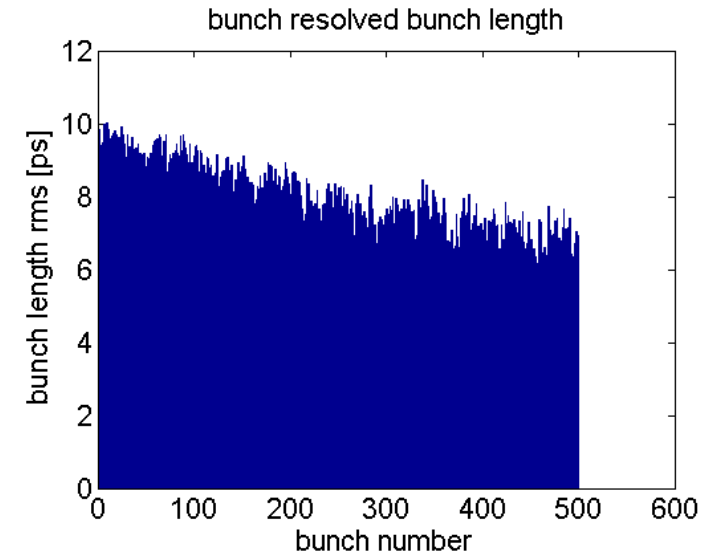
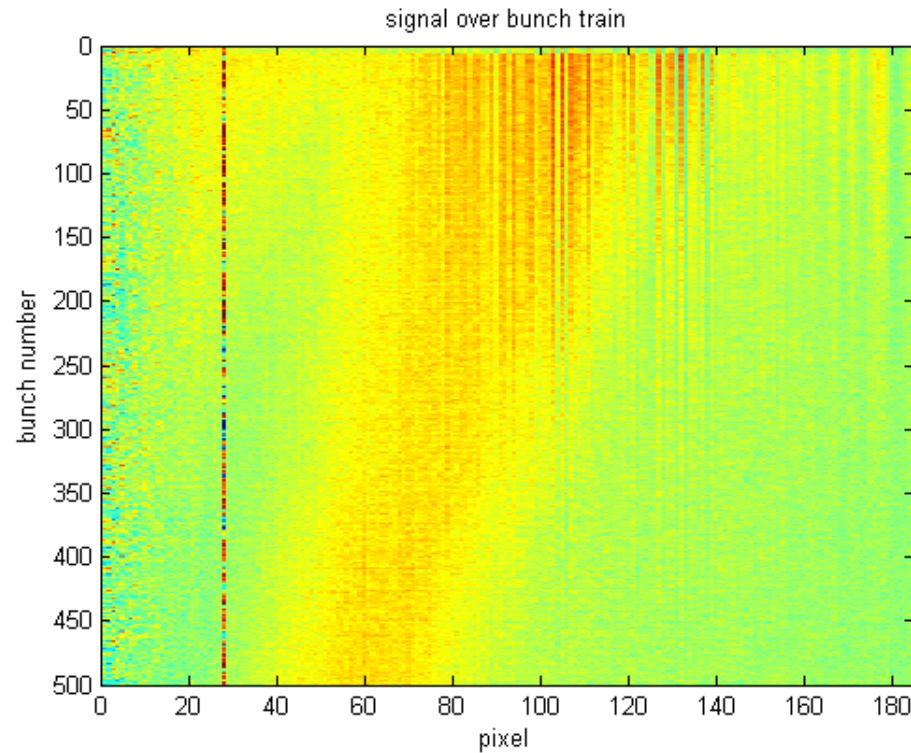


→ Defined relation between  
time and frequency

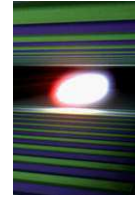
# Measurements from the XFEL injector



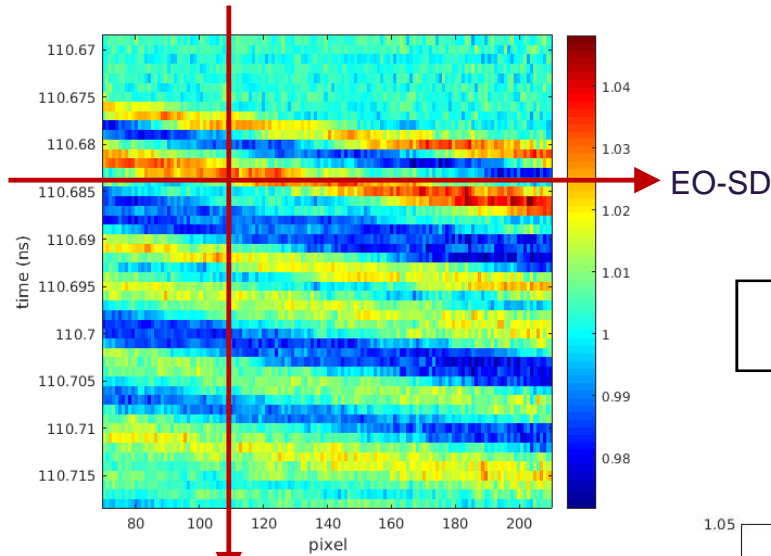
- Data from a single bunch train
- Bunch charge dropping from 400pC to 320pC over the bunch train
- Bunch length and arrival time from fitted Gaussian



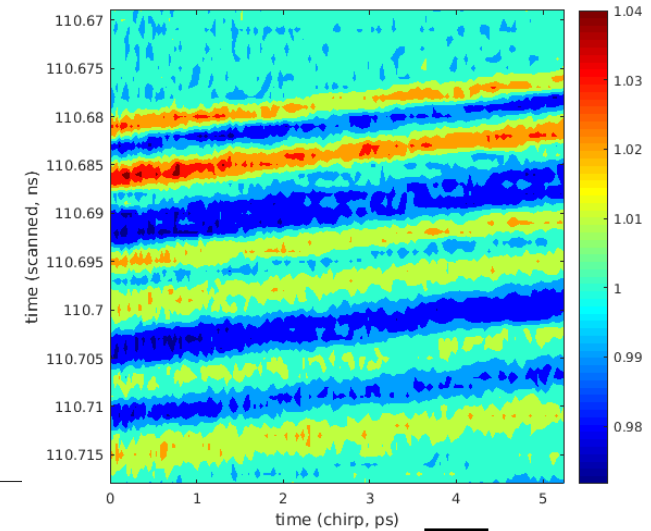
# Measurements from XFEL-BC1 (700MeV, after compression)



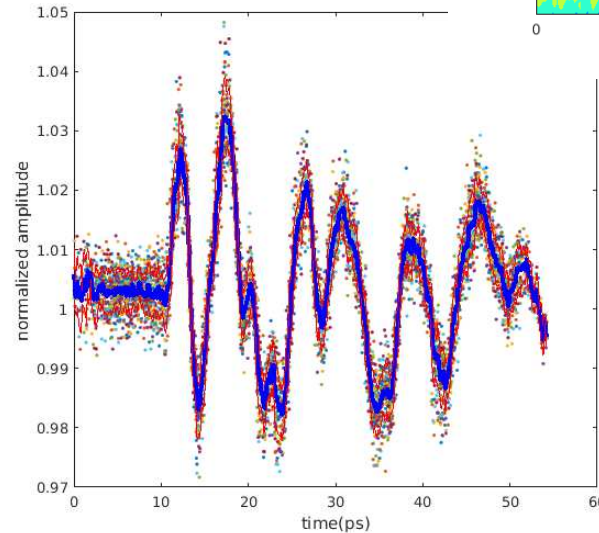
Raw signal from 20 bunches each line



Preliminary data with misaligned laser!



Corrected with  
laser chirp



Stacked data

Current status:

- Laser fixed, but no new measurements.
- Strong signal from wakes
- No decent signal from bunch (should be a lot higher...)
- No multi-bunch measurements yet (lack of beam time)