

# Coherent Diffraction Radiation experiment

Maximilian Micheler, Grahame Blair, Gary Boorman, Pavel Karataev,  
Konstantin Lekomtsev

John Adams Institute at Royal Holloway

Roberto Corsini, Thibaut Lefevre

CERN

We also would like to acknowledge help of Dr. V.Antonov for target manufacturing, J. Taylor for the workshop efforts, and Dr David Howell for his useful advises on hardware development

September 17, 2009

## Last meeting:

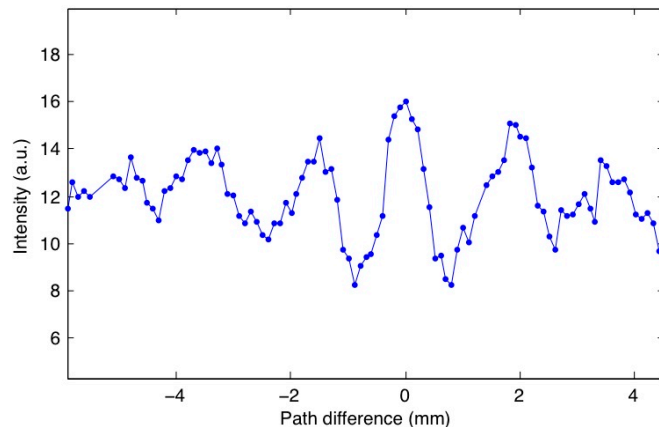
- Observed some CDR signals
- Discovered some downstream backgrounds from OTR screen/dump
  - able to identify the source/reason of the main backgrounds
- Do not totally understand the interferometer
- Might want to use a different splitter
- Might want to use a polariser

Changed some components of the interferometer:

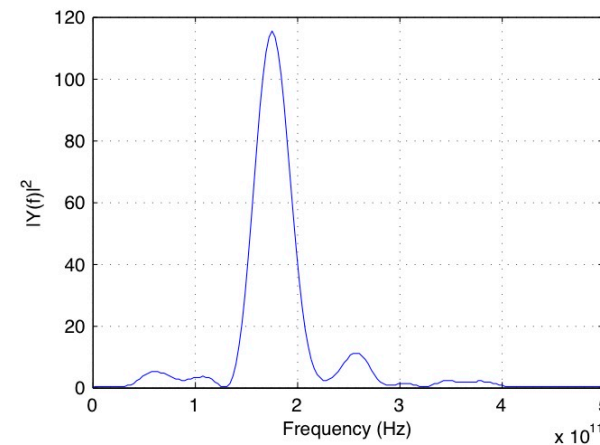
- used Kapton beam splitter material instead of Mylar
- installed a polariser in front of the interferometer
- experimented with different polariser orientations for CSR and CDR

Obtained interferograms for CSR:

- Example interferogram



- Corresponding spectrum



Trying to obtain reproducible interferograms and interferograms for CDR, but ...

## Some difficulties we encountered:

- some problems with signal levels
  - the detectors are extremely sensitive to the frequency range
    - for some detectors intensity is too little (might be on the edge of coherency) – wavelength 2.14 – 3.33 mm
    - for some detectors intensity is too much, i.e. signal distorts dramatically (need to attenuate the input level) – wavelength 3.33 – 5 mm
  - one of the translation stages broke (probably due to radiation from the dump)
    - limited flexibility (we were not able to use two detectors at a time)
    - we will have a substitute for the broken stage from next week onwards
  - polariser is causing some problems (although it should make the measurements better) – we might take it out for now

Unfortunately, we have been slowed down a bit by these problems

### Outlook:

- Installation of translation stage as soon as possible
- Off-center flange is manufactured at CERN and will be installed in the week of the CLIC Workshop (12. - 16. October)
  - Installation of the diamond UHV window at the same occasion
- Reconstruction of the bunch profile using Kramers-Kronig relation
  - ☞ wider spectral coverage needed
  - ☞ install translation stage
- Need to discuss the installation of the second target in January/February 2010

Observed first interferogram and obtained the spectrum, but we are still experiencing some technical difficulties