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for the LbSync Team

System Integration - LLRF Collaboration Meeting

Warszawa, 14.12.2011





Laser to RF conversion principles

- REFM application
- Project status
 - Status of the optics assembly
 - Electronics development
- Measurements results
- Summary



European

XFEL Outline





Main features:

- Generate 1.3GHz RF from laser pulse train
- Low phase drift
- Low phase noise

More about principles of operation can be found in THPA32 paper from FEL'11





XFEL FLASH Optical Synchronization System





XFEL Plan for the REFM box



Integration into 19" enclosure:

- Optical part (temperature controlled)
- Electrical part
- DRO + 1.3GHz amplifier
- External Power Supply (comercial)
- TMCB







XFEL Project status – optical part





Done:

Bread board prototype finished

Engineered version under development

- Modular design
- Active temperature control
- Components connected by fibers
- Two optical delay lines (customized) One Mach Zehnder Interferometer (commercial)

To-Do

- Already ongoing: engineering of modules at mech. Department
- To be done: arrangement of modules in 19" enclosure



XFEL Project status – electrical part



Done

- Prototype assembled and measured
- Bread board version set up for tests
- Final RF scheme designed
- RF components selected

To-Do

- Ordering processes ongoing
- PCB designing started









XFEL Long term drifts





Drifts measured with the out of loop phase detector of the prototype setup.

- Determined Kφ : 1.268 mV/fs
- Total drift (peak to peak): 14.9 fs
- RMS drift: 3.8 fs



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XFEL Phase noise measurement results







Problems:

Summary

- Humidity dependence -> solution: shorten fibers
- Temperature dependence -> control requiered
- Differential to single ended converter needed
 - -> necessity of designing custom PCB board for the prototype
- Project started on March 2011
- First complete PCB should be ready by the end of February'12
- Final tests, programming and automation planned for Spring'12
- Estimated end of project: June'12



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Thank you for your attention





















