

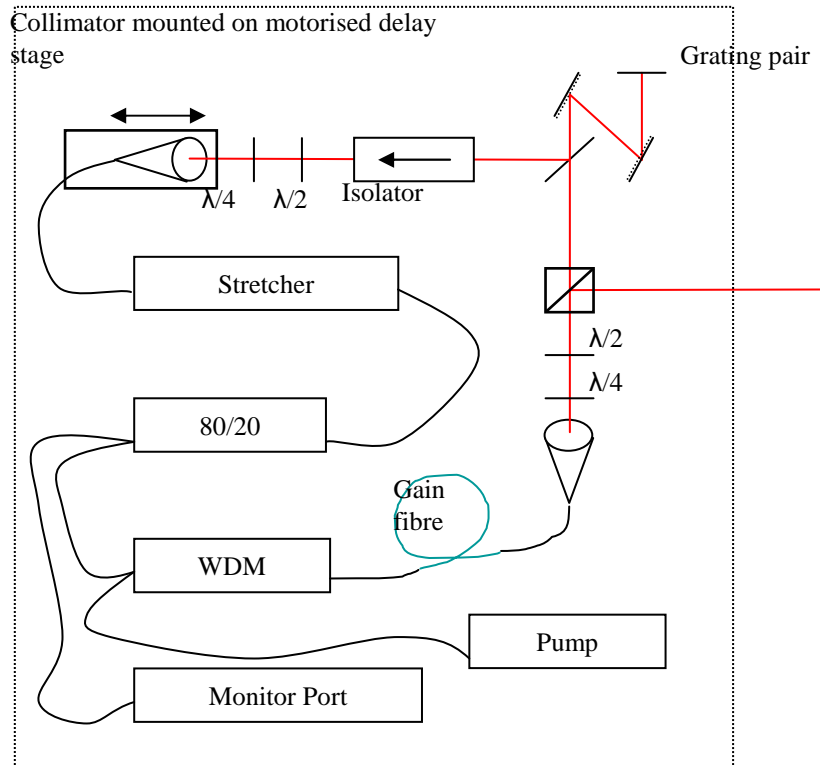
# EO at FLASH

Laurens Wissmann – IRUVX Expert meeting WP3 – 27 Oct 2009

# Outline

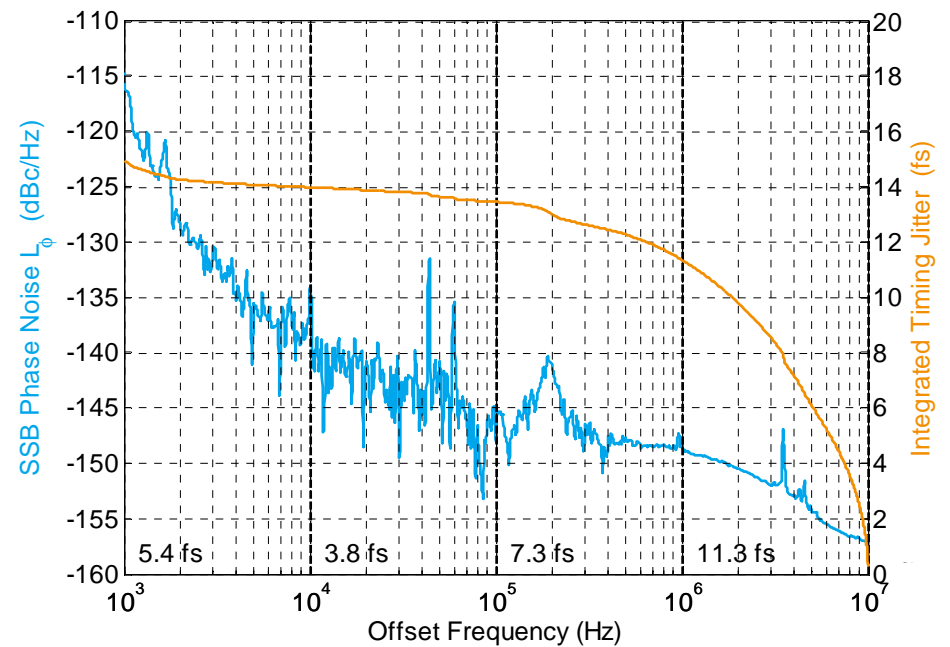
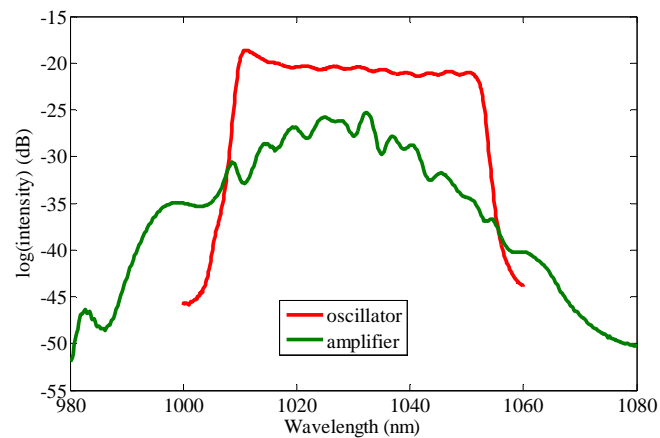
- Engineering of EOSD
  - Development of an Yb fibre laser
  - EO Monitor
  - Implementation & Automatisation
- Research
  - New crystals: GaAs, DAST
  - Other lasers: erbium fiber laser

# Yb fiber laser

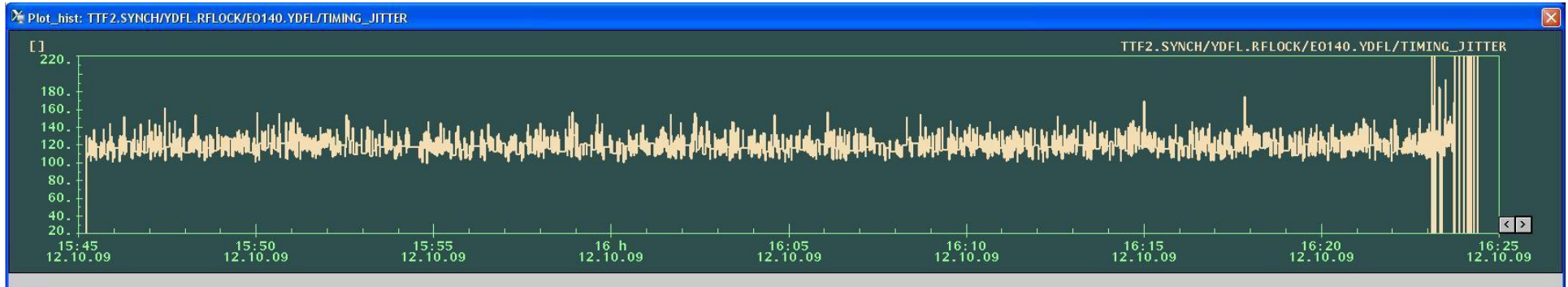
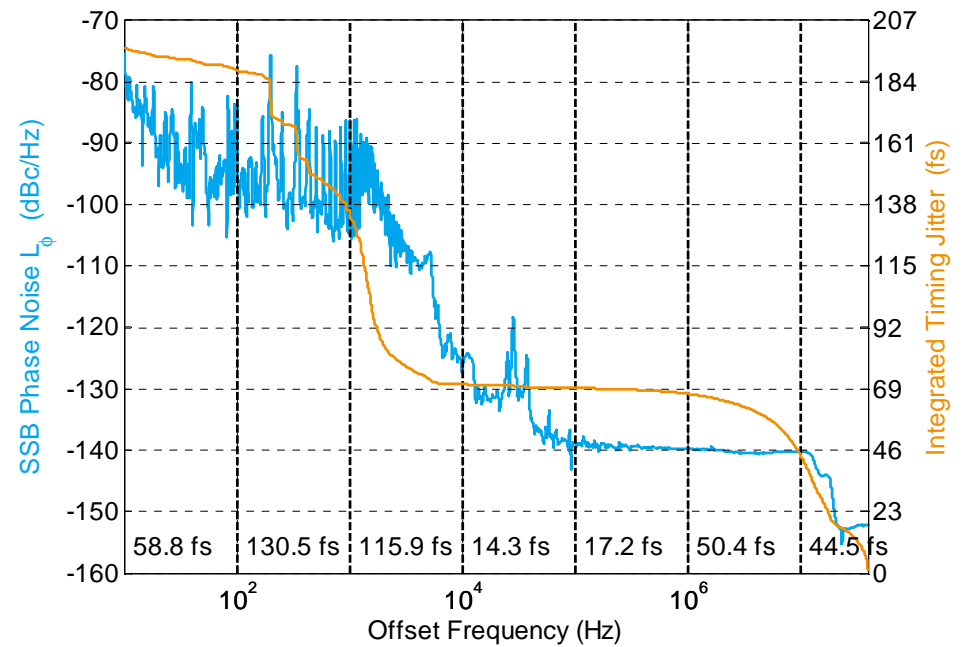
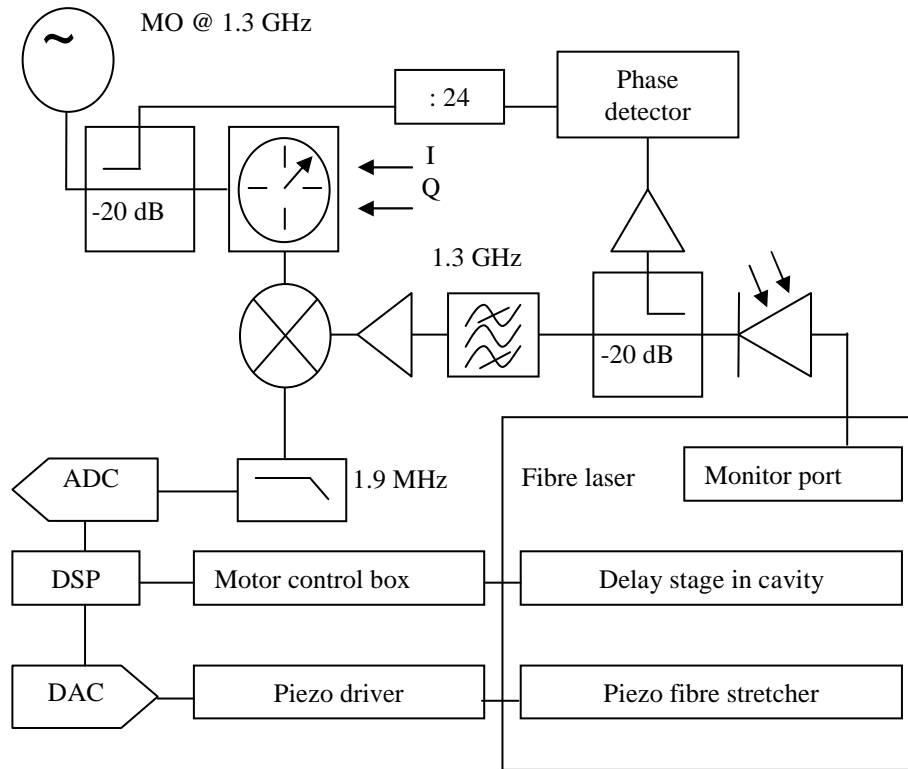


## Specifications

Bandwidth	40 nm
Pulse energy	1 nJ
Pulse length	comp. to <100 fs
int. tim. Jitter	1k-10M: < 30 fs

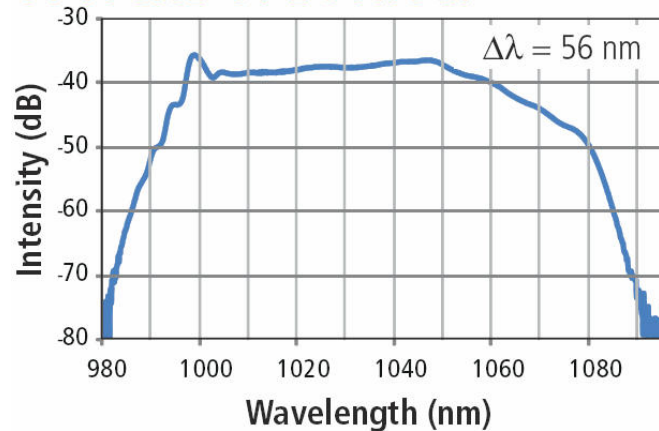


# Yb fibre laser: Synchronisation

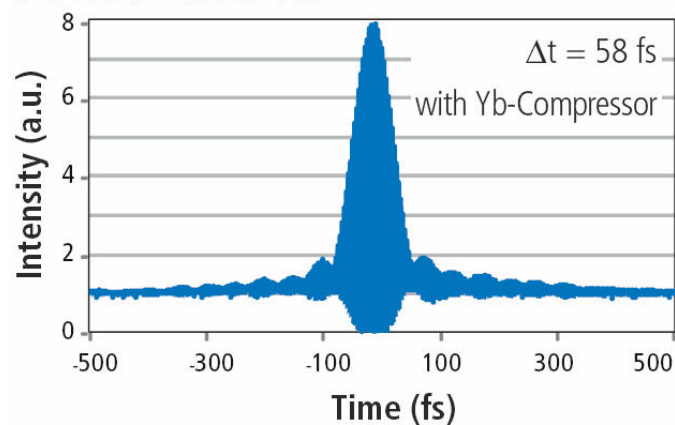


# Own Laser / MENLO Orange

OPTICAL SPECTRUM



PULSE WIDTH



Comparison

	Home-build laser	MENLO Orange
Bandwidth (nm)	40	55
Pulse Energy (nJ)	0.8	0.5
Pulse width (fs)	100	< 60
Int.Tim.Jitter	< 20	?
No. of iteration	first	fourth

# The EO monitor

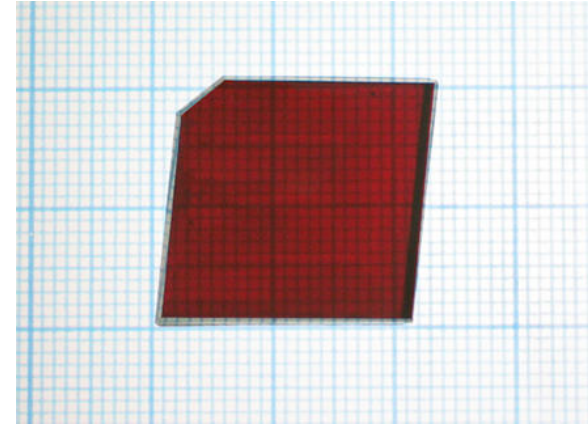
- Engineered version, from PSI
- Is currently being installed at 31 m (H8DBC2)
- Uses 0.5 mm GaP crystal
- Fibre coupled

# Automatisation & Implementation

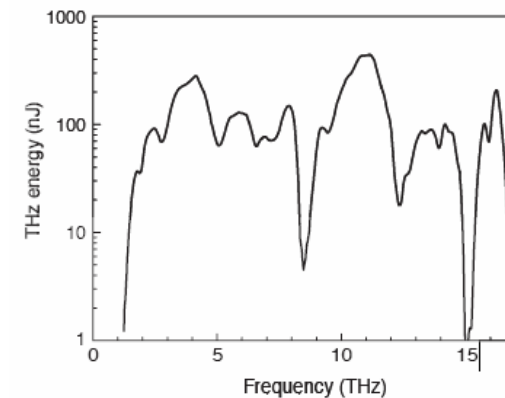
- Laser in tunnel -> remotely controlled setup
  - Several wave plates, laser power, synchronisation, gating, readout, laser diagnostics, data processing, ...
- Operator interface
  - Real-time data processing with MatLab
  - EO panel for non-experts in DOOCS
- Uptime cares!

# New crystals

- GaAs
  - Nearly matched to 1550 nm
  - Good quality crystals available
- DAST
  - 4-N,N-dimethylamino-4'-N' methyl stilbazolium tosylate
  - Organic crystal -> no strong lattice vibrations
  - Extremely large EO coefficient
  - But high residual birefringence
  - More than 15 THz bandwidth



THz Generation





# Other lasers: Erbium laser

- Fundamental nearly matched to GaAs
- Optical synchronisation feasible
- Frequency doubled EDFL:
  - Direct seeding for amplifier -> EOTD
  - Matched to ZnTe
  - EO Sampling with optical synchronisation

Thank You