

FOM-Institute for Plasma Physics Rijnhuizen



First lasing of FELICE

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on behalf of the FELIX team

FELICE

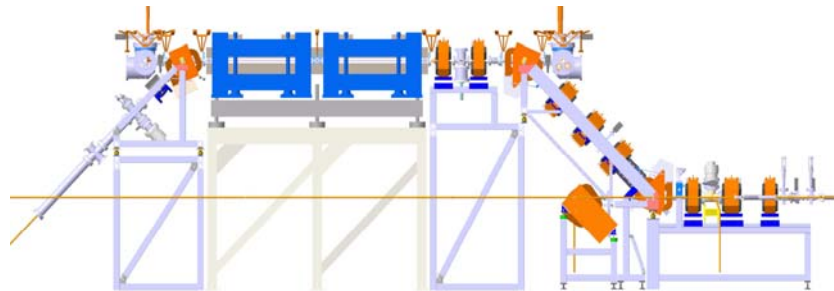


FELICE: a new beam line of the FELIX facility to allow intra-cavity user experiments, in particular 'action' spectroscopy of clusters and (complex) molecules and ions in the gas phase.

Specifications:

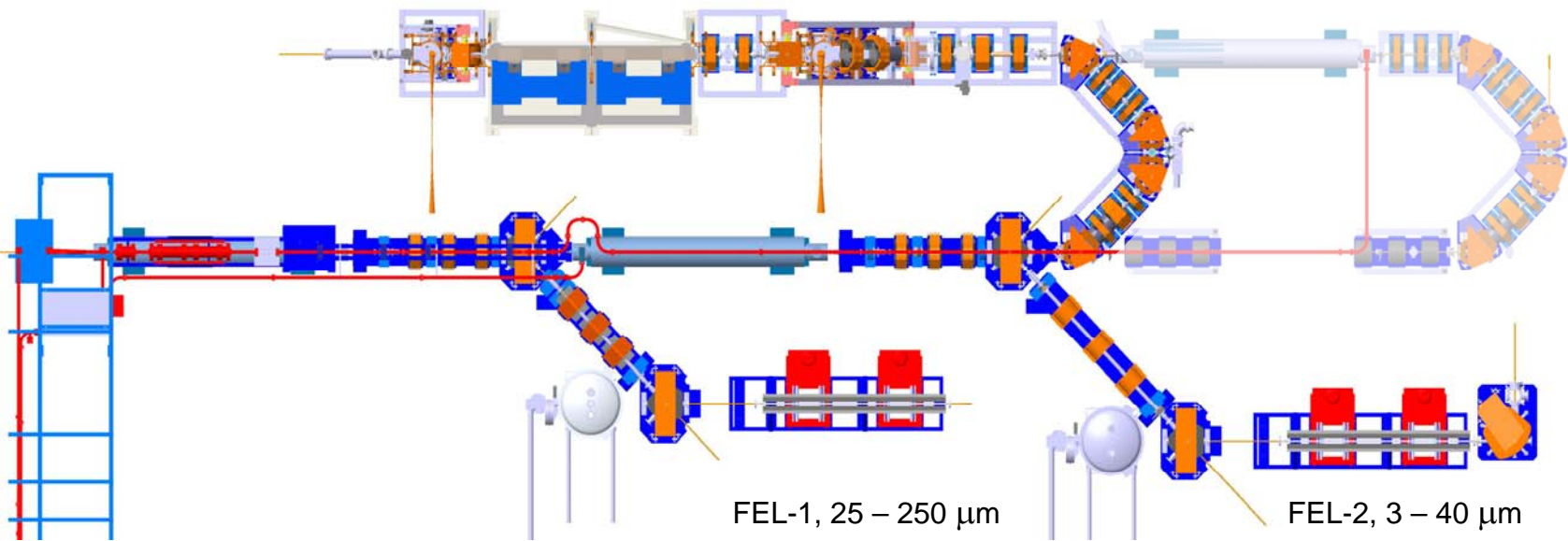
- wavelength range: 3 - 100 micron
- beam energy: 20 - 60 MeV
- bunch charge: 200 pC
- micropulse rep. rate: 1 GHz
- macropulse rep. rate: 10 Hz, interleaved with existing FELs
- micropulse energy: ≤ 1 mJ @ 0.4% rms BW
- secondary focus at the expt. station with small Rayleigh range
- (limited) access to expt. during operation

Layout of FELIX facility after upgrade



side view

FELICE

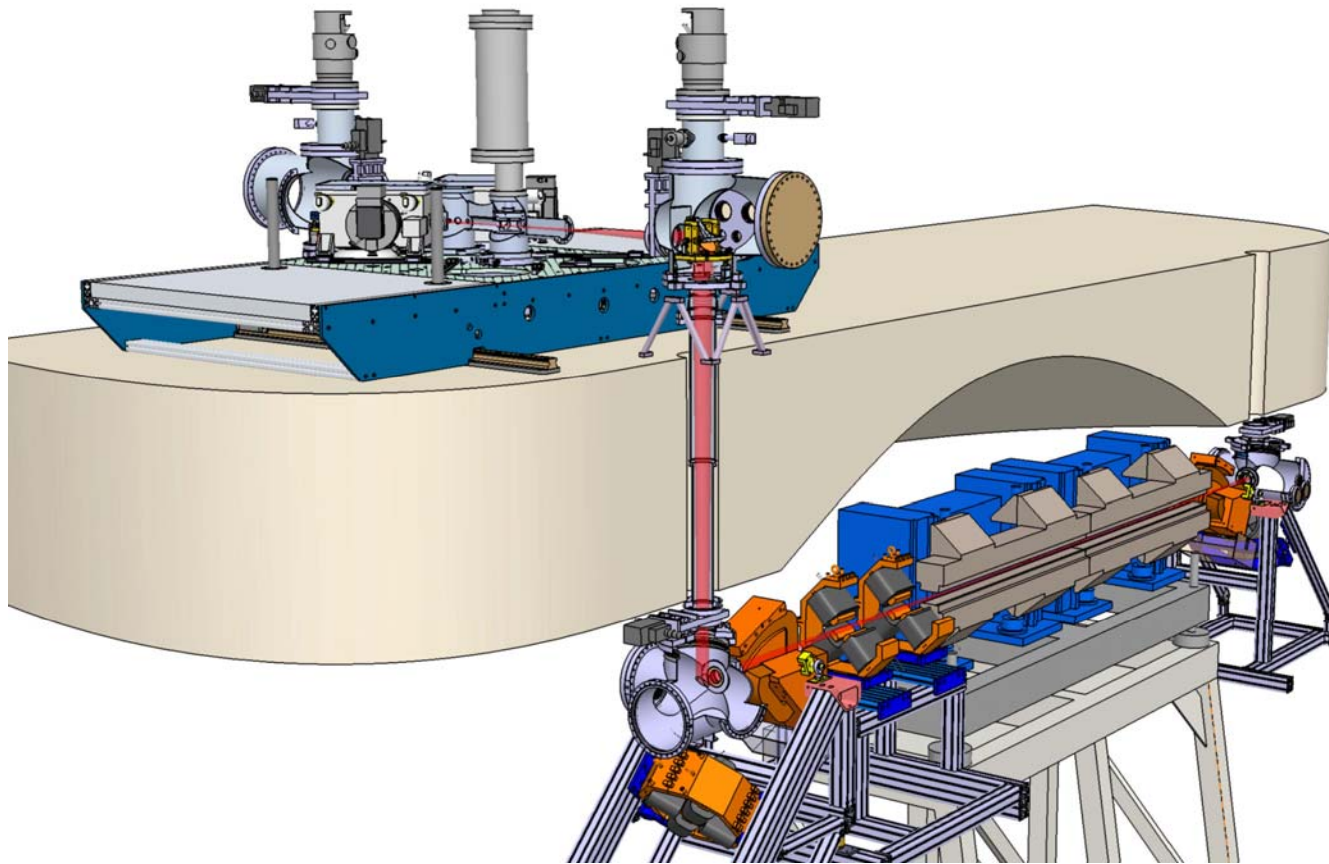


FEL-1, 25 - 250 μm

FEL-2, 3 - 40 μm

top view

Artist's view of FELICE



4-mirror, 9 m-long resonator with 5 cm Rayleigh range at experiment

Quasi-periodic undulator (from Danfysik)

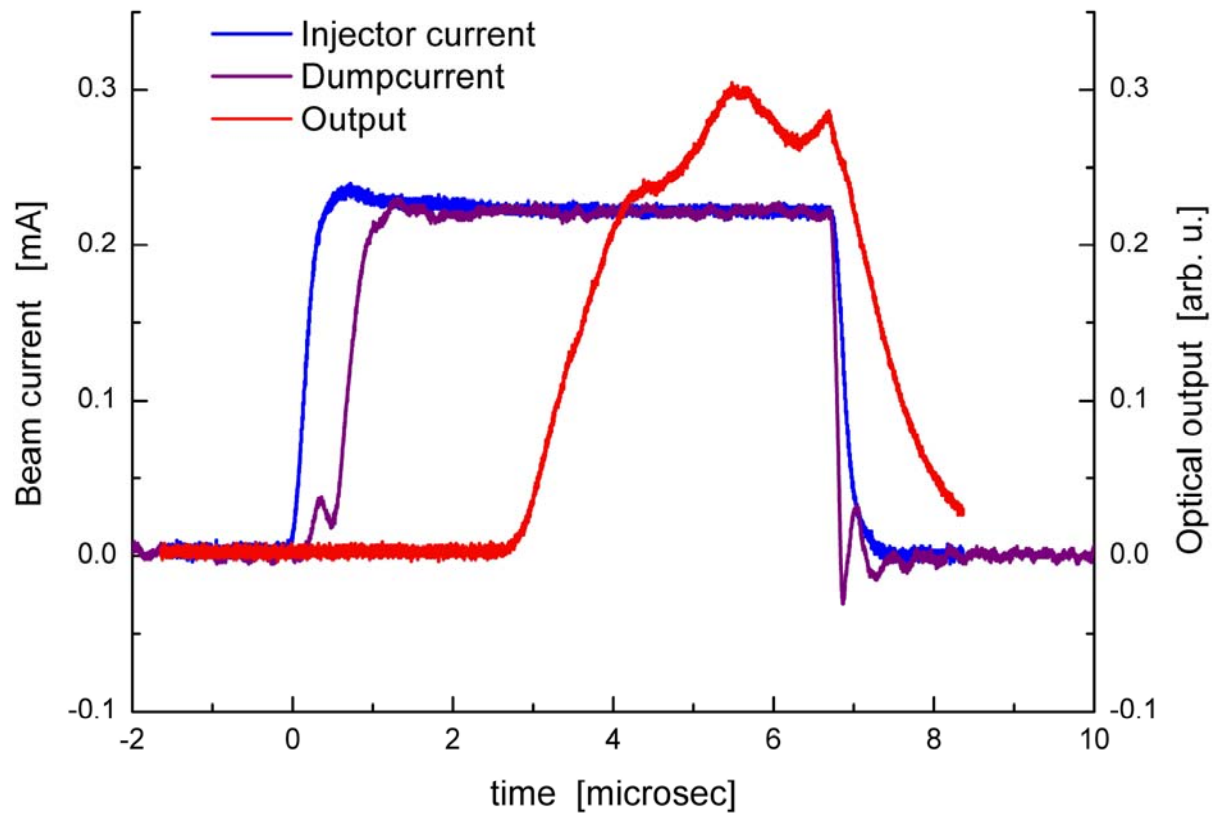


Number of periods: 46, period length: 60 mm

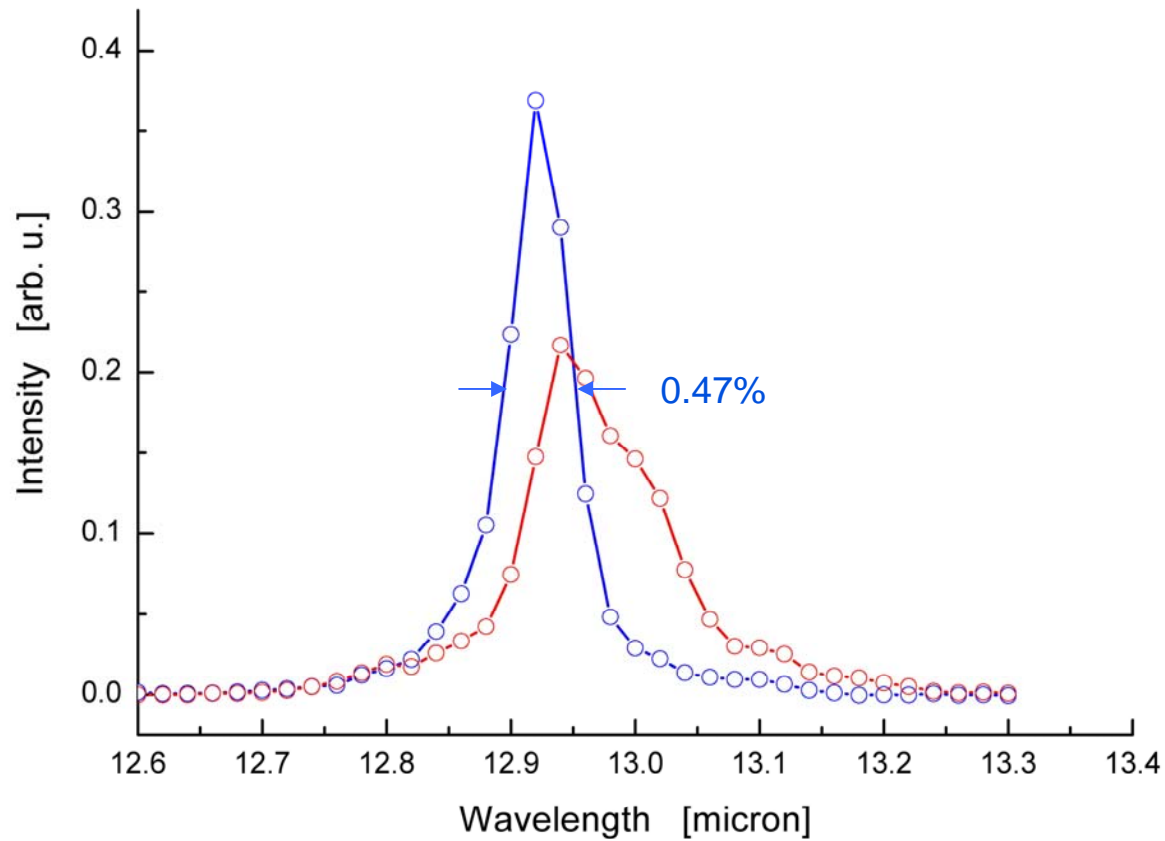
And then there was light.....



on Saturday, 11 August 2007, at 13 μm



First spectral measurements



Other provisional results



Measured cavity loss: 12.5%, i.e. 4.5% higher than expected

Measured net gain: > 80 %

Micropulse energy: 10 μJ outcoupled \longrightarrow \approx 400 μJ intracavity

Third-harmonic content: $\approx 2 \times 10^{-4}$

Interleaved operation with FEL-2 demonstrated