Spectral distribution as diagnostics

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DESY

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HELMHOLTZ ASSOCIATION

DESY

Quantitative estimation

Low estimate of pulse length:

Pulse length – spike width product > 0.44 (Gauss shape)

$t_{pulse} > 0.44*\lambda^2/(\Delta\lambda*c)$

“Good” lasing

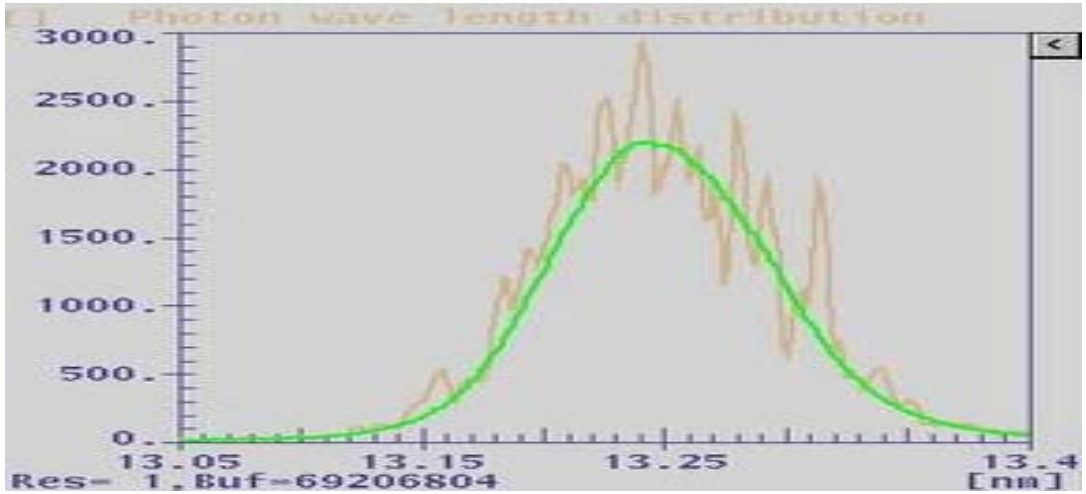
Oct 22, 13nm

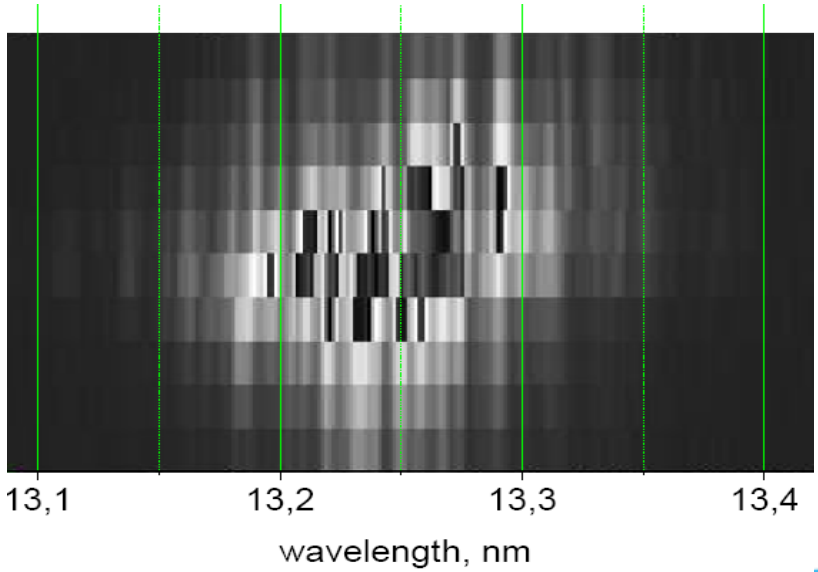
42 uJ

Small bandwidth (<0.85%)

Low shot-to shot fluctuations

Uniform spike width





~ 20 – 25 spikes

~0.005 nm width ?

t > 55 fs

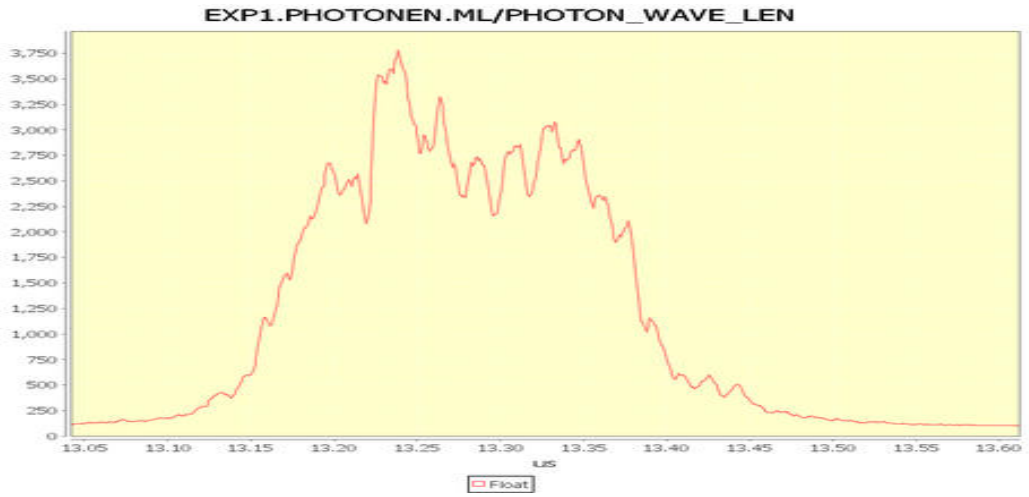
tc ~ 2.5 fs

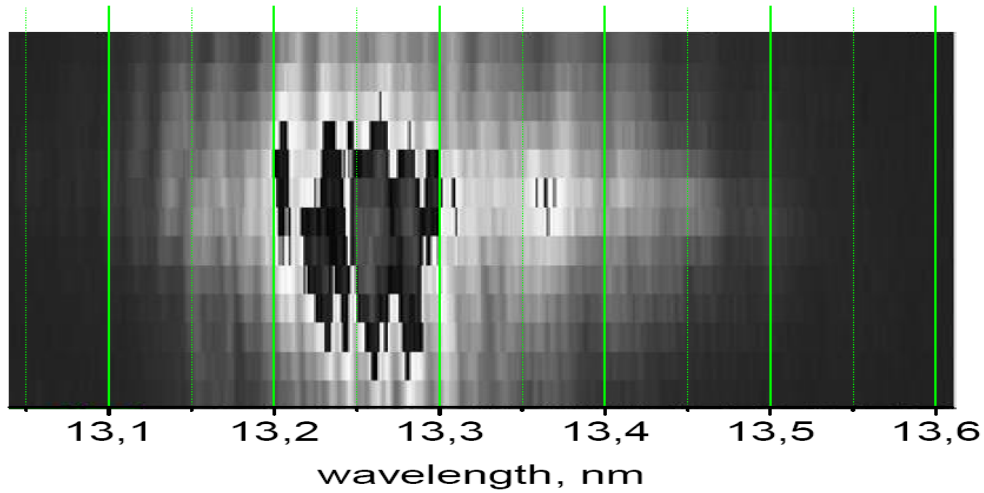
13 nm

Oct 1, 13nm

115 uJ

bandwidth ~1.6%



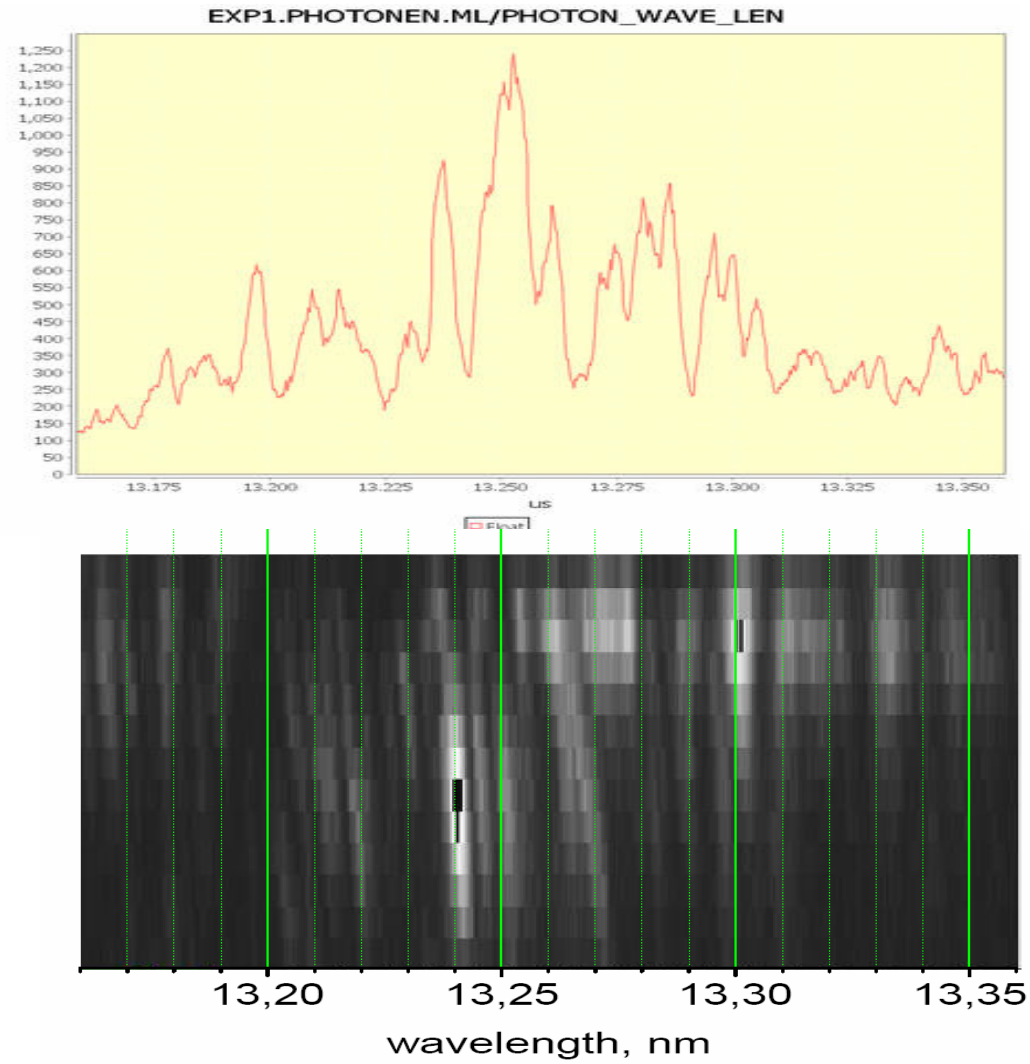


13 nm

Oct 1, 13nm

115uJ

bandwidth ~1.6%



~ 0.0015 nm width ?

t > 200 fs

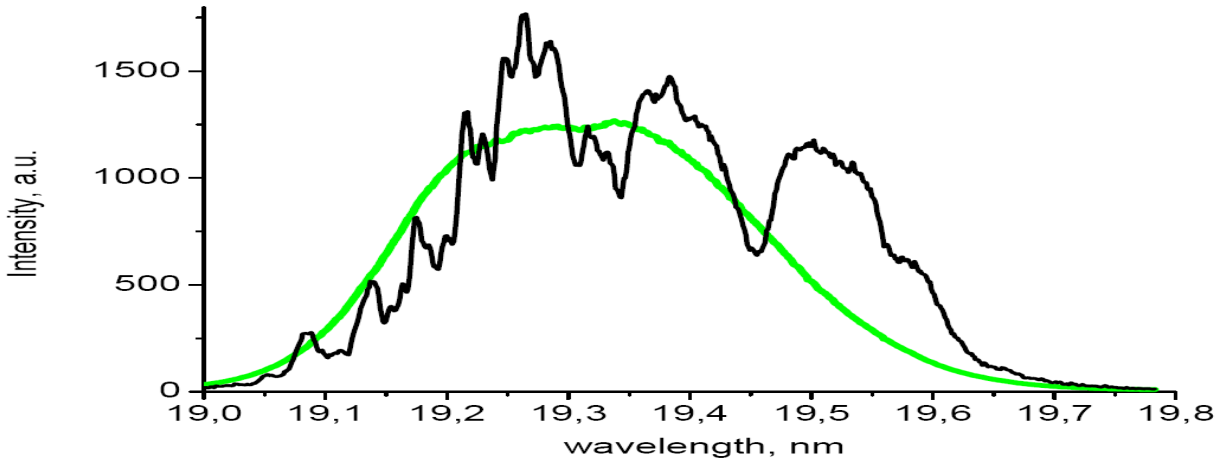
tc ~ 1.2 fs

19nm

Aug 14, 19nm

120 uJ (?60 uJ)

Bandwidth 1.7% – 2.3%

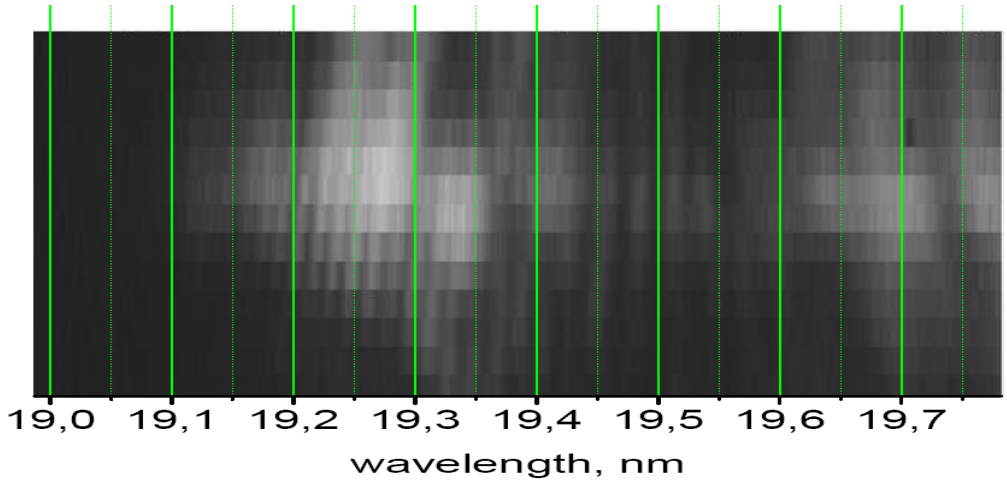


~? spikes

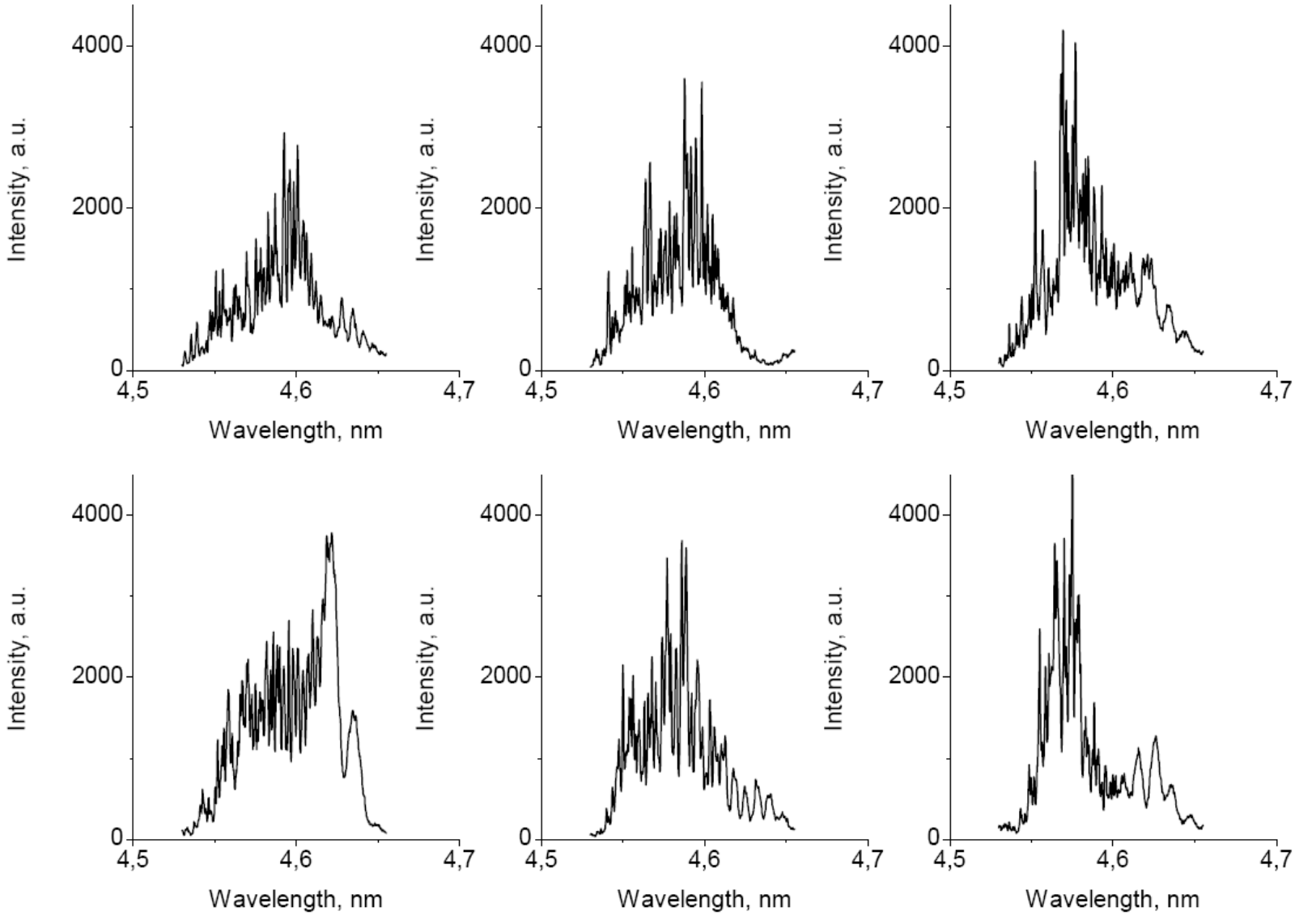
~ 0.01 nm width ?

t > 55 fs

tc ~ 1.5 fs



4.6 nm

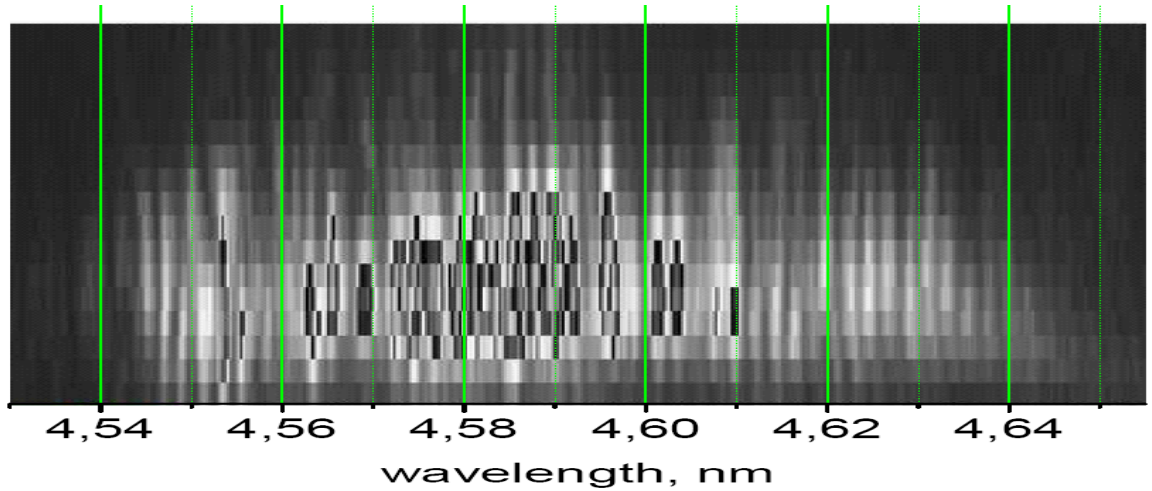


4.6 nm

Sep 24, 4.6 nm

120 uJ

Bandwidth ~ 1% - 1.5%

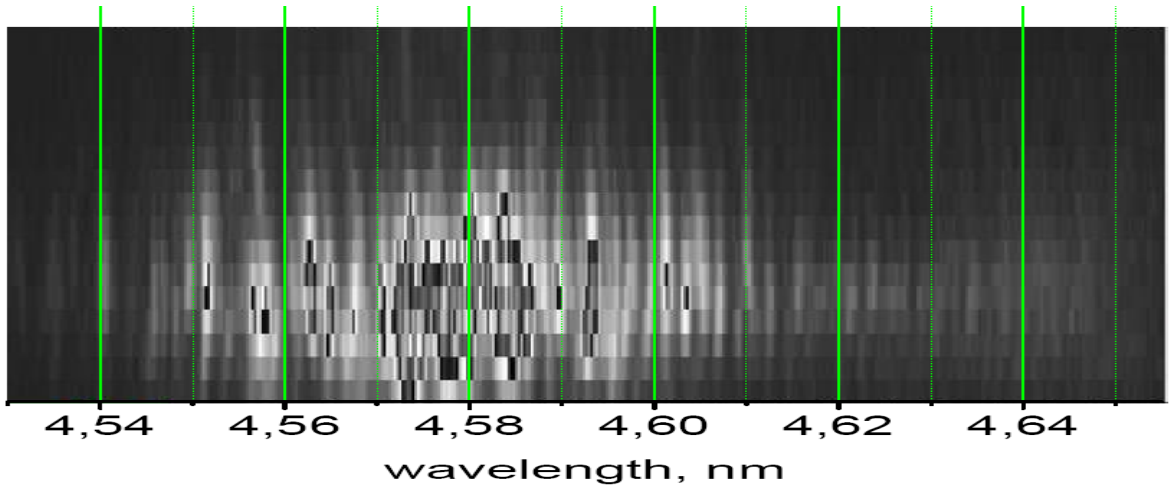


~ 50 – 60 spikes

~0.001 nm width ?

t > 35 fs

tc ~ 0.7 fs

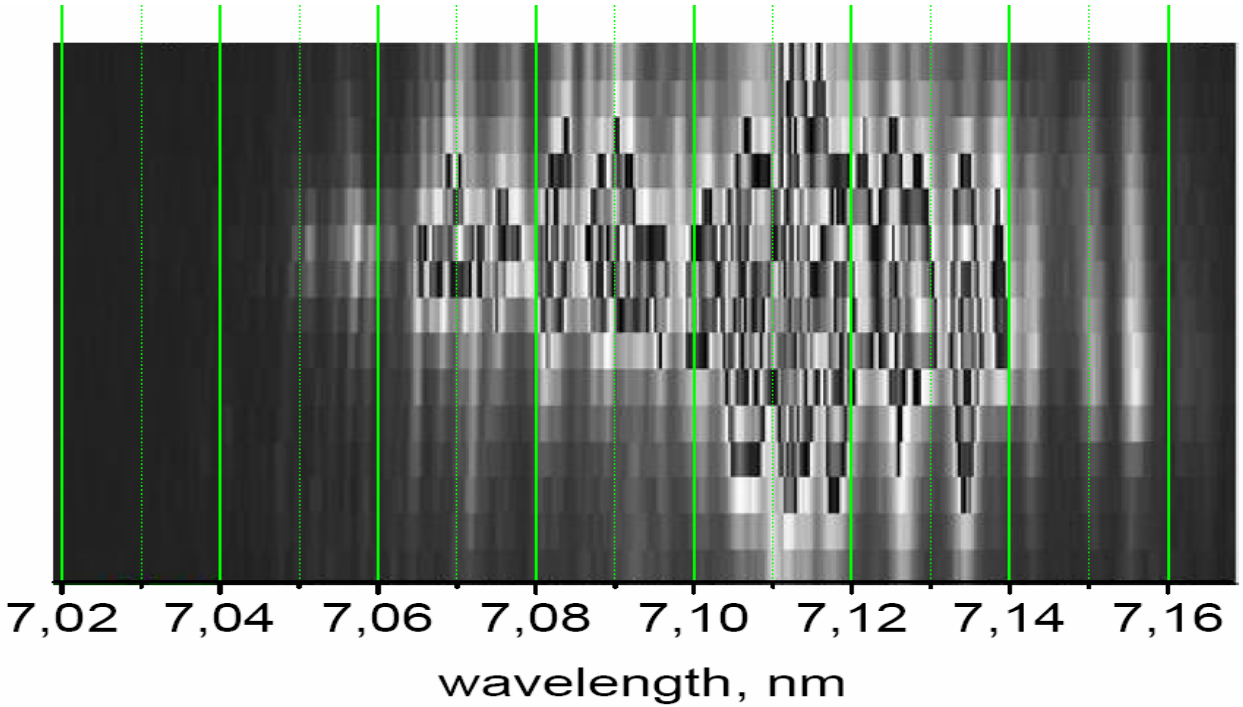


7 nm

Nov 10, 7 nm

100 uJ

Bandwidth ~ 1%



> 40 spikes

~0.001 nm width ?

t > 75 fs

tc ~ 1 fs