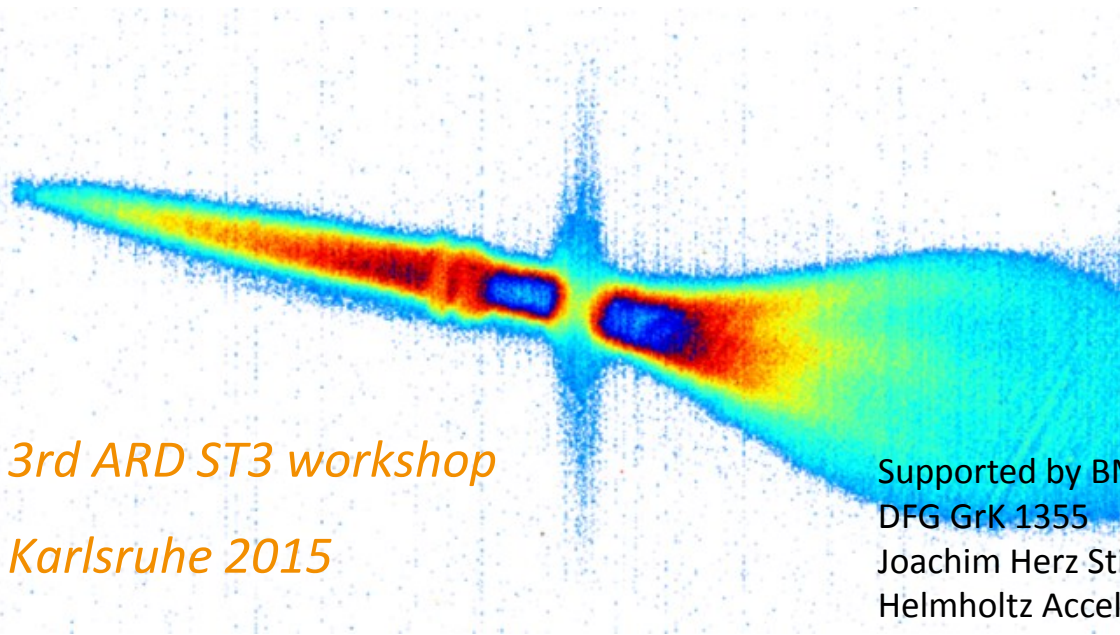
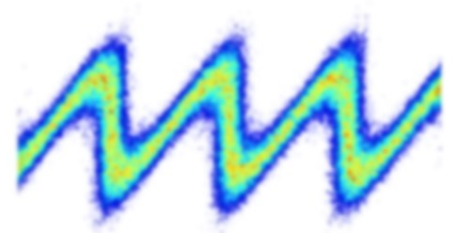


Seeding experiment at FLASH

Jörn Bödwadt on behalf of the seeding team



3rd ARD ST3 workshop

Karlsruhe 2015

Supported by BMBF under contract 05K13GU4 and 05K13PE3
DFG GrK 1355

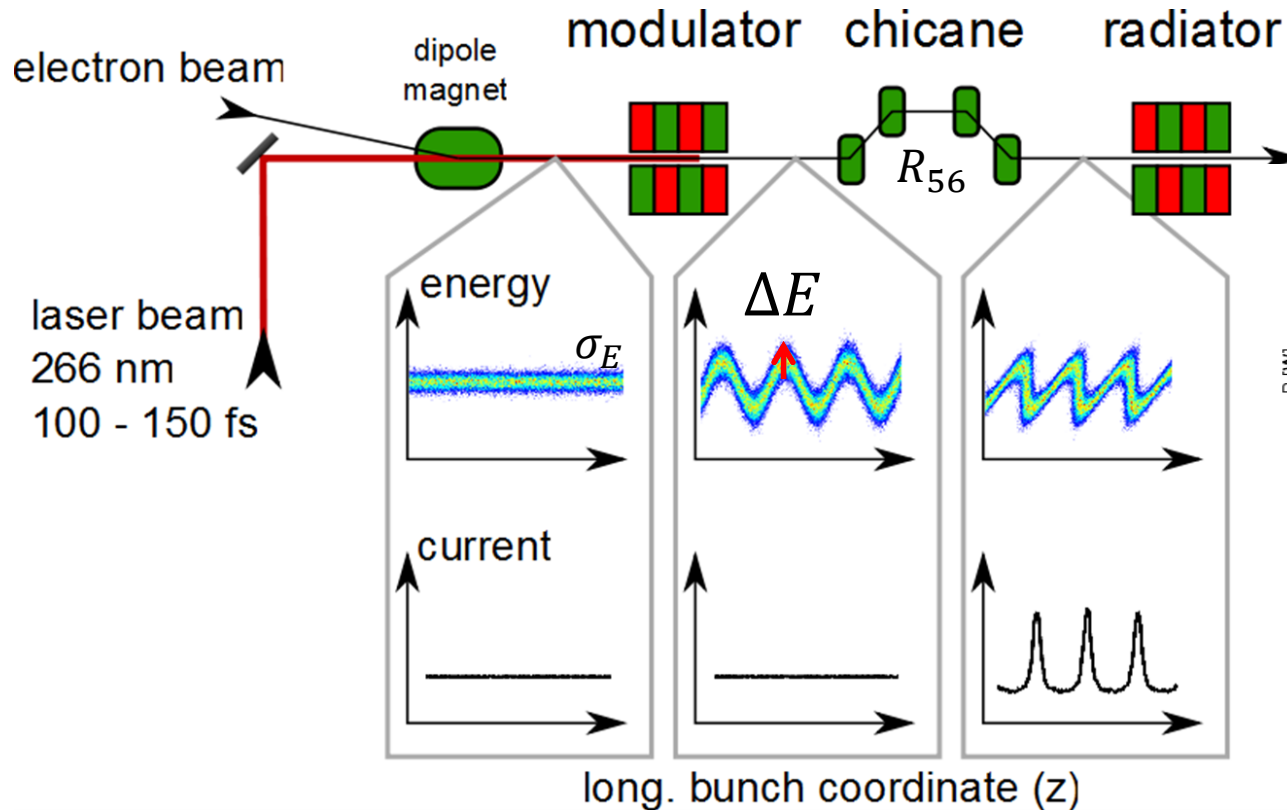
Joachim Herz Stiftung

Helmholtz Accelerator R&D



High-Gain Harmonic Generation

> Operation principle



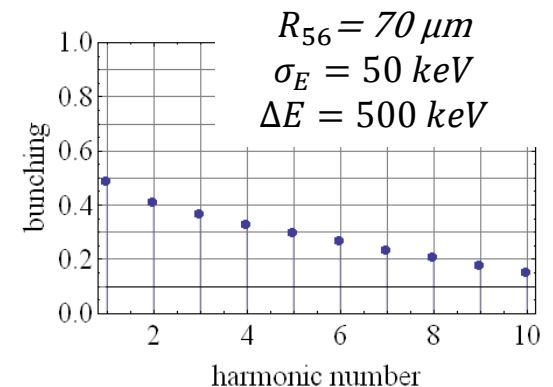
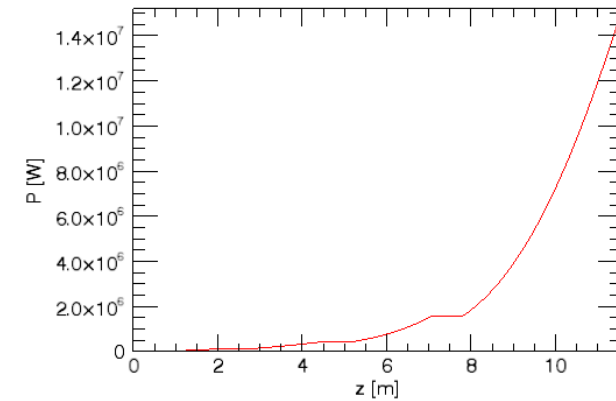
Bunching factors:

$$b_n = \exp \left[-\frac{1}{2} \cdot \frac{(2\pi)^2 n^2 R_{56}^2 \sigma_E^2}{\lambda^2 E_0^2} \right] \cdot J_n \left(\frac{2\pi n \Delta E R_{56}}{\lambda E_0} \right)$$

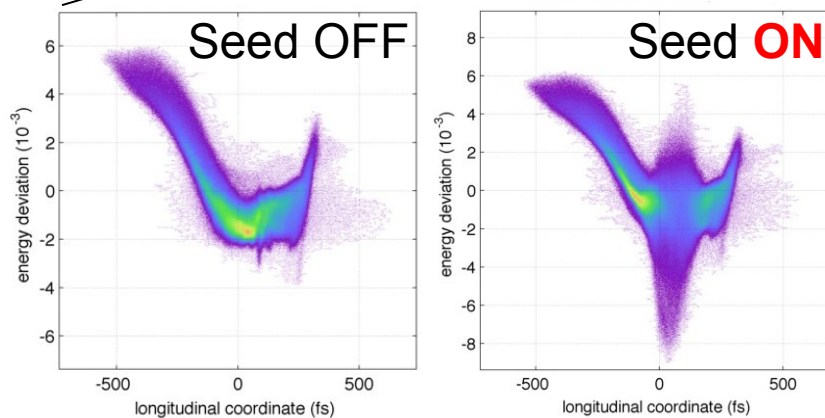
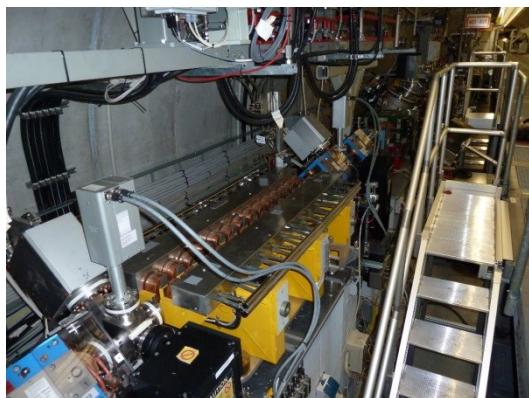
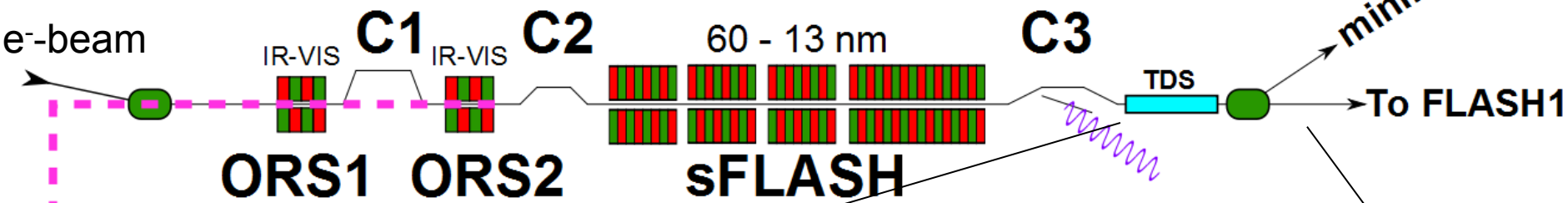
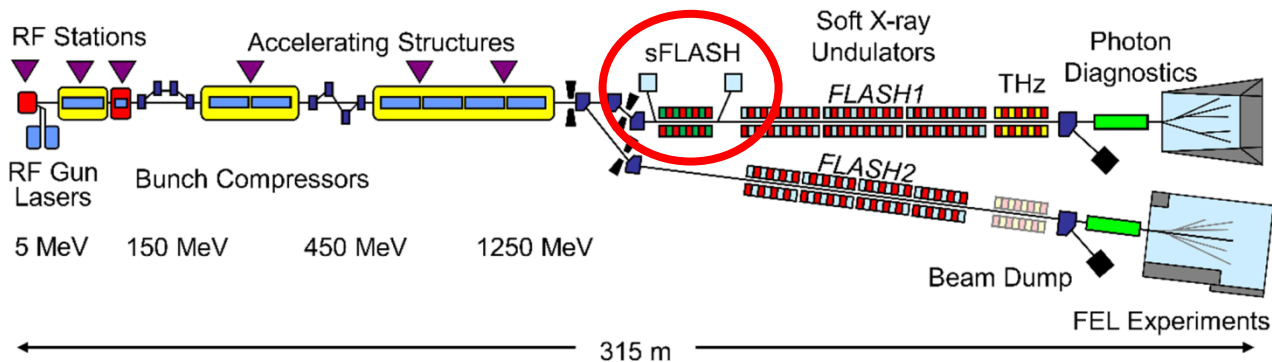
n : harmonic number

high-gain FEL

at 7th harmonic



Layout at FLASH

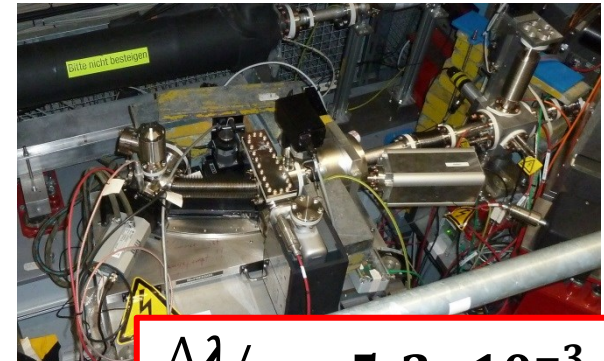


FEL gain at 38 nm (7th harmonic)

mean pulse energy: $(12.5 \pm 12) \mu\text{J}$

maximum pulse energy: $75 \mu\text{J}$

estimated gain length: $\sim 0.9 \text{ m}$



$$\frac{\Delta\lambda}{\lambda} \sim 5.2 \cdot 10^{-3}$$

