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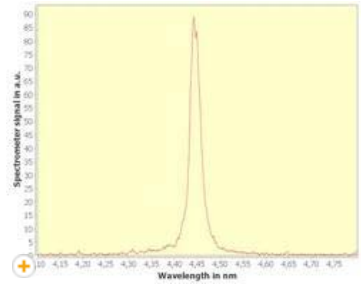
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Record wavelength at FLASH – First lasing below 4.5 nanometres at DESY’s free-electron laser

For the first time, FLASH produced laser light with a wavelength of 4.45 nanometres; thus, DESY’s free-electron laser for soft X-ray light considerably beat its previous record of 6.5 nanometres. At the same time, the peak intensity of single light pulses nearly doubled, with 0.3 millijoule. Prior to this, there was a five-month machine upgrade, above all with a significant improvement of the superconducting linear accelerator and the installation of a seeding experiment together with the University of Hamburg.

FLASH, the world’s first X-ray free-electron laser is available to the photon science user community for experiments since 2005. Last winter, the facility underwent a major upgrade. The accelerator was equipped with a seventh superconducting accelerator module to increase the maximum electron energy to 1.2 Giga-electronvolts (GeV). Moreover, a special [3.9-GHz module](#) was installed to improve the quality of the accelerated electron bunches. The first tests during the current commissioning showed excellent results: the linear accelerator was operated at 1.207 GeV and the 3.9-GHz module shapes the electron bunches in a way that the intensity of the laser light is higher than ever before.



The spectrum of the record laser pulse peaks at a wavelength of 4.45 nanometres.

„It is absolutely impressive, how fast and promising FLASH is operating after such a substantial upgrade. My compliments to the FLASH accelerator team,“ congratulates Reinhard Brinkmann, director of the DESY accelerator section. With the now obtainable laser wavelength, experiments with carbon in organic molecules come within reach, and magneto-dynamics experiments with the third-harmonic wavelength benefit from substantially increased intensities.

This success is also an important milestone for the European XFEL on the way to the observation of movements that only take femtoseconds. The accelerator module recently built-in at FLASH is a prototype for the XFEL accelerator, and the properties of the 3.9-GHz module too are decisive for operating the XFEL injector. The third FLASH user period is to start end of August.

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