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Laser-driven soft x-ray undulator source

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In the relatively new field of laser-plasma accelerators significant progress has been recently achieved, such as reaching the 1.0 GeV level. After a short description of the relevant physics of this new type of electron accelerators and a quick look at the state of the art, I will present a first break-through towards applications, namely a laser-driven soft x-ray undulator source. By controlling the electron beam transport we have reached a remarkably stable operation, producing soft x-ray flashes with an estimated duration of just a few femtosecond. This is the first milestone towards few-femtosecond x-ray pump-probe experiments. Along a second path my group aims at realizing a laser-driven x-ray free-electron-laser which would be of university-lab scale only. A brief discussion of this long term project and its perspectives is given.