Overview of recent electron acceleration and X-ray generation results from Garching

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After its move from MPQ to an interim location at the LEX facility at the LMU, the ATLAS laser has recently been upgraded to 200 TW peak power, serving a new experimental area with electron acceleration and ion acceleration beamlines. We will report on the first campaign with the new system in 2016. Electron acceleration has been studied in various injection schemes, yielding high-charge beams (up to nC level) with broadly tunable parameters (0.1-1.5 GeV). The combination of shock-front and colliding pulse injection yields two independently tunable, quasi-monochromatic electron bunches with prospect for driver-witness-type PWFA experiments. A few-cycle shadowgraphy/faraday rotation probe pulse was used for the study of wakefields and beam currents down to the low 10^{18} cm^{-3} density regime. In addition to the first observation of a fully broken bubble in the LWFA process, this diagnostic also proved the excitation of a wake by the primary LWFA electron bunch in a secondary plasma target as a first step towards true hybrid acceleration schemes.

In the field of X-ray generation, we continued our successful previous work [1] towards applications of betatron radiation in medical imaging. Furthermore, we performed measurements and imaging using both single-pulse [2] and dual-pulse [3] Thomson scattering.

Finally, we will give a brief status update of the ongoing 3-PW upgrade of ATLAS in the new CALA laboratory.

References

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