CFEL SCIENCE

SEMINAR

8th May 2013 - 11:00 a.m.
Building 99, seminar room IV (O1.111)

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Gigawatt-scale isolated attosecond pulse by high-order harmonic generation

We demonstrate the first generation and full characterization of microjoule-energy isolated attosecond extreme ultraviolet pulses, which have sufficient power for inducing nonlinear phenomena in atoms and molecules as well as for attosecond pump/attosecond-probe spectroscopy. An almost 100-fold energy-enhancement over previous results became possible by combining the energy-scaling method of high-order harmonic generation with two-color infrared waveform synthesis, which permits us to significantly relax the technological requirements on the driver laser system. The produced isolated pulses with a duration of 500 attoseconds, as characterized by an nonlinear autocorrelation using the Coulomb explosion of N_2, and maximum energy up to 1.3 μJ open the door to the realm of nonlinear attosecond science. The peak power of our table-top light source reaches 2.6 GW, which even surpasses that of a compact free-electron laser in the extreme-ultraviolet region, the peak brightness is estimated to be ~ 10^{30} photons/(mm^{2}mrad^{2}s).

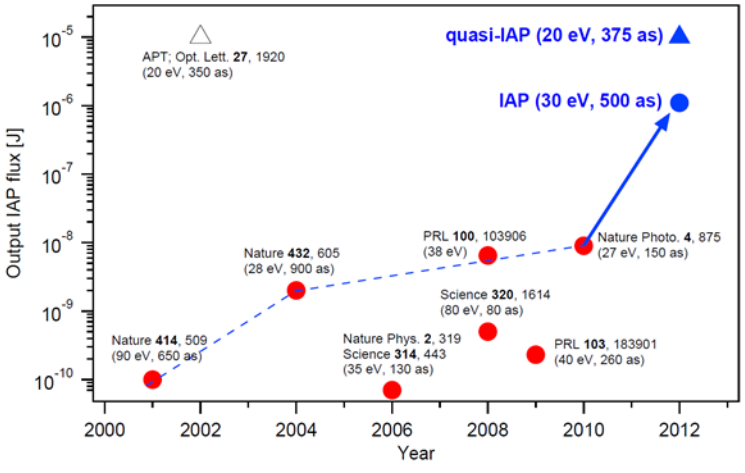

Fig. 1 Progress of the isolated attosecond pulse (IAP) energy. Red circles: previous milestone results using various schemes, and blue points: our HHG sources.

Host: Franz X. Kärtner, CFEL UX Seminar