

Widely tunable two-color pulses for double resonant pump-probe experiments

Maurizio Sacchi

*Institut des NanoSciences de Paris, Université Pierre et Marie Curie
and Synchrotron SOLEIL*

A new configuration of the FERMI source has been developed and tested, which is capable of delivering two-colour time-delayed pulses with independent wavelength tunability over an ample spectral range ^(*). This new scheme makes use of two seed laser beams of different wavelengths and of a split radiator section to generate two FEL pulses from distinct portions of the same electron bunch. Combined with the seeded nature of the FERMI source, this provides improved conditions for two-colour FEL experiments that require tuning both the pump and the probe to selected atomic resonances. The performance of this new two-colour scheme has been tested in a resonant scattering experiment ^(*), probing the magnetization dynamics in systems containing two magnetic elements. Widely tuneable two-colour pulses from a seeded FEL source have potential for original applications in other fields of condensed matter, atomic and molecular physics.

(*) E. Ferrari, C. Spezzani, F. Fortuna, R. Delaunay, F. Vidal, I. Nikolov, P. Cinquegrana, B. Diviacco, D. Gauthier, G. Penco, P. Ribič, E. Roussel, M. Trovò, J-B. Moussy, T. Pincelli, L. Lounis, M. Manfredda, E. Pedersoli, F. Capotondi, C. Svetina, N. Mahne, M. Zangrando, L. Raimondi, A. Demidovich, L. Giannessi, G. De Ninno, M. B. Danailov, E. Allaria, and M. Sacchi
Widely tunable two-colour seeded free-electron laser source for resonant-pump resonant-probe magnetic scattering
submitted to Nature Commun.