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Ultrafast Pump-probed Resonant Elastic X-ray Scattering Station Based on Soft X-ray Free Electron Laser in Shanghai

X-ray Free Electron Laser (XFEL) represents the cutting-edge advancements in light sources, characterized by their exceptional features of ultra-short pulse durations, extraordinarily high pulse peak brightness, and remarkable coherence. These intrinsic properties establish a development for practical implementations in ultrafast X-ray diffraction and scattering techniques. With the successful construction of the Soft X-ray Free Electron Laser facility in Shanghai, we have enabled the establishment of the XFEL-based Resonant Elastic X-ray Scattering (REXS) experimental station, which offers a remarkable platform for investigating and exploring long-range states, such as charge, orbital, and spin states, in strongly correlated systems. Notable examples of such states encompass superconducting phases, microscopic magnetic structures, and charge density waves, among others. Moreover, The REXS station facilitates selective excitation of electronic states within correlated systems by employing infrared pump lasers. Subsequently, the ultra-short pulse duration of the XFEL, reaching the remarkable timescale of 100 femtoseconds, enables precise detection and comprehensive exploration of the ultrafast dynamic processes associated with these states. Thus, this platform provides an ideal opportunity to investigate transient superconductivity, magnetization dynamics, and various other phenomena of scientific interest.

Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

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