

Microsymposium

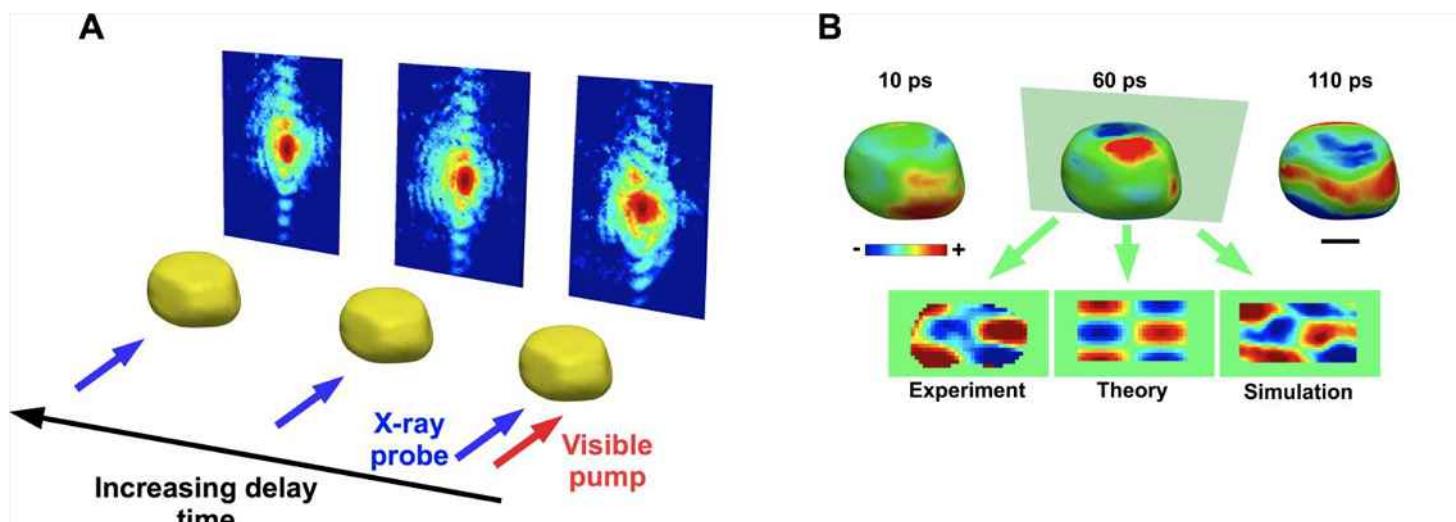
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Three-dimensional imaging of acoustic phonons using an X-ray laser

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Key insights into the behaviour of materials can be gained by observing their structure when they undergo lattice distortion. Laser pulses on the femtosecond time scale can be used to induce disorder in a "pump-probe" experiment with the ensuing transients being probed stroboscopically using femtosecond pulses of visible light, X-rays or electrons (Fig. 1 A). Here we report two- and three-dimensional imaging of the generation and subsequent evolution of coherent acoustic phonons on the picosecond time scale within single gold nanocrystals using an X-ray free electron laser (Fig. 1 B). Our results allow comparisons between experiment and predictive models based on continuum elasticity theory and molecular dynamics simulations (Fig. 1 B). *Full author list - J.N. Clark L. Beitra, G. Xiong, A. Higginbotham, D. M. Fritz, H. T. Lemke, D. Zhu, M. Cholle, G. J. Williams, M. Messerschmidt, B. Abbey, R. J. Harder, A. M. Korsunsky, J. S. Wark, D. Reis, I. K. Robinson.



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