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Femtosecond low-energy dynamics of superconducting and spin-density wave gaps in pnictides K.W. KIM, A. PASHKIN, M. BEYER, H. SCHÄFER, M. PORER, T. WOLF, C. BERNHARD, J. DEMSAR, R. HUBER, A. LEITENSTORFER — Magnetism and superconductivity (SC) in pnictides as well as a possible link between them are subjects of intense studies. The infrared spectral regime plays a pivotal role en route to a microscopic understanding since it provides direct access to the fundamental low-energy excitations, such as spin-density waves (SDW) and SC-induced energy gaps. We investigate Ba(Fe,Co)2As2 by combining ellipsometry and ultrabroadband terahertz (THz) pump-probe experiments. Following a femtosecond near-infrared excitation, the spectral hallmark of SDW located in the 10 - 30 THz window disappears with a characteristic saturation fluence of $\Phi_s \approx 50$ J/cm^2 and recovers fast ($\tau < 1$ ps), while the SC gaps below 3 THz are fully closed at a much smaller fluence $\Phi_s \approx 3$ J/cm^2 and exhibit a slower relaxation behavior ($\tau > 10$ ps). The distinct spectral, temporal and saturation behavior provide a unique environment to monitor the interplay of the two order parameters. Furthermore we observe coherent oscillation at 5.5 THz which corresponds to an Arsenic vibration. Our results may add new aspects toward an understanding of interactions between fundamental excitations in pnictides.

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