114.

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Abstract:Time-domain spectroscopy of coherent optical phonons in bismuth germinate (Bi3Ge4O12) is presented. Utilizing both impulsive stimulated Raman scattering and time-domain terah ertz spectroscopy, more than 12 unique vibrational states ranging in frequency from 2 to 11THz are identified, each with coherent lifetimes ranging from 1 to 20ps. These modes are highly sensitive to crystal orientation and demonstrate frequency shifts on picosecond timescales consistent with an anharmonic lattice potential. & copy; 2011 IOP Publishing Ltd.