159. Title: Coherent phonons in pyrochlore titanates A(2)Ti(2)O(7) (A = Dy, Gd, Tb): A phase transition in Dy2Ti2O7 at 110 K

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Abstract: We study the generation of coherent optical phonons in spin-frustrated pyrochlore single crystals Dy2Ti2O7, Gd2Ti2O7, and Tb2Ti2O7 using femtosecond laser pulses (65 fs, 1.57 eV) in degenerate time-resolved transmission experiments as a function of temperature from 4 to 296 K. At 4 K, two coherent phonons are observed at similar to 5.3 THz (5.0 THz) and similar to 9.3 THz (9.4 THz) for Dy2Ti2O7 (Gd2Ti2O7), whereas three coherent phonons are generated at similar to 5.0, 8.6, and 9.7 THz for Tb2Ti2O7. In the case of spin-ice Dy2Ti2O7, a clear discontinuity is observed in the linewidths of both the coherent phonons as well as in the phase of lower-energy coherent phonon mode, indicating a subtle structural change at 110 K. Another important observation is a phase difference of pi between the modes in all the samples, thus suggesting that the driving forces behind the generation of these modes could be different in nature, unlike a purely impulsive or displacive mechanism.