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Experimental Analogy to Time-Independent Solutions to Schrödinger's Equation: A Level Splitting Approach to Phononic Band Gaps SHAWN HILBERT, NOAH WEISS, HERMAN BATELAAN, University of Nebraska–Lincoln — A delta barrier inside an infinite potential well is the usual starting point for discussing level splitting, avoided crossings, and band gaps. These same phenomena are found in physical systems such as electronic conductors/insulators and photonic crystals. Here, we explore another physical system—a continuous sound wave propagating through an array of partially reflecting acoustic mirrors. We show, experimentally and by calculation, that for the above system, the following general description holds. When two identical acoustic cavities are brought into each other's vicinity, a weak coupling between the two initially degenerate states (i.e. resonant frequencies) gives rise to level splitting. Adding a third identical cavity results in a triplet of states and so on. For an array of identical cavities, a one-dimensional crystal lattice forms where the multiplet merges into a band of states. These bands are separated by phononic band gaps.

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