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Phononic frequency combs through nonlinear resonances RU-WEN PENG[1], Nanjing University, LU-SHUAI CAO, Universität Hamburg, DONG-XIANG QI, MU WANG, Nanjing University, PETER SCHMELCHER, Universität Hamburg — It is well known that optical frequency combs have become important coherent optical sources with diverging applications, ranging from optical frequency metrology to ultracold gases. In this work, we explore an analogue of optical frequency combs in driven nonlinear phononic systems, and present a mechanism for generating phononic frequency combs through nonlinear resonances. In the underlying process, a set of phonon modes is simultaneously excited by the external driving which yields frequency combs with an array of discrete and equidistant spectral lines of each nonlinearly excited phonon mode. Frequency combs through nonlinear resonance of different orders are investigated, and in particular the possibility of correlation tailoring in higher-order cases is revealed. We suggest that our results can be applied in various nonlinear acoustic processes, such as phonon harvesting, and can also be generalized to other nonlinear systems. Reference: L. S. Cao, D. X. Qi, R. W. Peng, Mu Wang and P. Schmelcher, Phys. Rev. Lett. 112, 075505 (2014).

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