Abstract Submitted
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Non-Symmorphic and Quasi-periodic PhoXonic Crystals[1] CHEONGYANG KOH, EDWIN THOMAS, Massachusetts Institute of Technology — PhoXonic(X=n,t) Crystals allow for the manipulation of elastic and electromagnetic wave propagation. This has led to an abundance of novel effects such as negative refraction, artificial birefringence and complete band-gaps. The key to these effects lies in the design of the artificial structure of the medium. A rational approach towards this task may be adopted by choosing the correct symmetry; hence both the dispersion relations and the normal modes can be controlled and interpreted in the symmetry framework. By continuous deforming a structure from i) The periodic approximant of a quasi-periodic structure to its maximal subgroup and ii) a starting symmorphic plane group into a related non-symmorphic plane group, we demonstrate control over where to open up complete in-plane (TM) and out-of-plane gaps (TE) for 2D phononic(photonic) systems and enforce artificial degeneracy of certain bands through "sticking" along certain directions. We can also selectively enhance curvatures for certain bands, providing a handle for "mode-engineering." We also identify features of the dispersion relations that are i)invariant to deformations preserving discrete space group symmetry and ii)invariant to deformations preserving topology. All these features of the band structure become transparent within the symmetrical framework, pointing a rational approach towards designing phoXonic devices.

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Cheong Yang Koh
massachusetts institute of technology

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