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【103】Inverse-design magnonic devices

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Spin waves, and their quanta magnons, are of great interest as potential data carriers in future low-energy computing devices. Here, we will present the method of inverse-design magnonics, in which any functionality can be specified first, and a feedback-based computational algorithm is used to obtain the device design. Our proof-of-concept prototype is based on a rectangular ferromagnetic area that can be patterned using square-shaped voids. We explore linear, nonlinear, and nonreciprocal magnonic functionalities and use the same algorithm to create a magnonic (de-)multiplexer, a nonlinear switch, and a circulator. Thus, inverse-design magnonics can be used to develop highly efficient rf applications as well as Boolean and neuromorphic computing building blocks.

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