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**Spin-wave fractals in a quasi-one-dimensional magnonic crystal**

DANIEL RICHARDSON, Colorado State University, BORIS KALINIKOS, St Petersburg Electrotechnical University, LINCOLN CARR, Colorado School of Mines, MINGZHONG WU, Colorado State University — Fractals are a ubiquitous phenomenon in nonlinear physics and a key facet of natural systems, from the lungs in our bodies to attractors underlying the weather. Spin-wave fractals have previously been observed in a $Y_3Fe_5O_{12}$ (YIG) thin film-based active feedback ring, where the periodic amplification ensures the strong nonlinearity of the spin waves, while the periodic feedback was used as a time-dependent potential to create regions of large dispersion in the spin-wave spectrum. Strong nonlinearity and high dispersion are two essential ingredients needed for fractal development. This presentation reports for the first time that it is also possible to use a position-dependent potential to create the large dispersion necessary for fractal formation. As the power ($P_{\text{in}}$) delivered to the magnonic crystal increases, one observes that a frequency comb forms around the input microwave frequency ($f_0$), where the strongest peak sits at $f_0$. As $P_{\text{in}}$ is increased further, each peak in the comb evolves into its own, finer frequency comb. If $P_{\text{in}}$ is increased even further, one can observe yet another set of finer frequency combs.

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