A microwave realization of the Gaussian symplectic ensemble

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Following an idea by Joyner et al. [1] a microwave graph with an antiunitary symmetry T obeying $T^2 = -1$ has been realized [2]. The Kramers doublets expected for such systems have been clearly identified and could be lifted by a perturbation which breaks the antiunitary symmetry. The observed spectral level spacings distribution of the Kramers doublets is in agreement with the predictions from the Gaussian symplectic ensemble (GSE), expected for chaotic systems with such a symmetry. After 50 year of random matrix theory this has been the first experimental realization of the GSE. In addition recent results on the two-point correlation function, the spectral form factor, the number variance and the spectral rigidity will be presented, as well as the transition from GSE to GOE statistics by continuously changing T from $T^2 = -1$ to $T^2 = 1$.

References

[1] C. H. Joyner, S. Müller, and M. Sieber. Europhys. Lett. 107, 50004 (2014).

[2] A. Rehemanjiang, M. Allgaier, C. H. Joyner, S. Müller, M. Sieber, U. Kuhl, and H.-J. Stöckmann. Phys. Rev. Lett. 117, 064101 (2001).