

# Level attraction in metamaterials

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As a general physical phenomenon, level attraction arising from dissipative coupling widely exists in diverse systems, for instance the recent discoveries in optomechanical system<sup>1</sup>, coupled cavity magnon system<sup>2</sup> and cavity trion-polariton system<sup>3</sup>. In this work, we report level attraction can also exist in metamaterials. By coupling two sets of resonant structures, we observed the coalescence of hybridized modes in the frequency domain. Furthermore, electric control of level attraction has also been demonstrated by incorporating an actively tunable component into one resonant structure. Our work has spotted the dissipative coupling effect in metamaterials, which may have been ignored in this research field over time. The experimental observations reported in this work may offer a new insight to characterize and design metamaterials.

[1] N. R. Bernier, Phys. Rev. A 98, 023841 (2018).

[2] M. Harder, Phys. Rev. Lett. 121, 137203 (2018).

[3] S. Dhara, Nature Physics 14, 130–133 (2018).

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