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Breakdown of the Meissner effect at the zero exceptional point in non-Hermitian two-band BCS model

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The spontaneous symmetry breaking of a continuous symmetry in complex field theory at the exceptional point of the parameter space is known to exhibit interesting phenomena, such as the breakdown of a Higgs mechanism. In this work, we derive the complex Ginzburg-Landau model from a non-Hermitian two-band BCS model via path integral and investigate its spontaneous symmetry breaking. We find that analog to the Higgs mechanism, the Meissner effect of the complex Ginzburg-Landau model also breaks down at the exceptional point while the gap parameters stay finite.

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