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Classifying the phases of gauge theories by spectral density of probing chiral quarks

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We describe our recent proposal that distinct phases of vector-like gauge theories with fundamental quarks translate into specific types of low-energy behavior in Dirac spectral density. The resulting scenario is built around new evidence substantiating the existence of a phase characterized by bimodal (anomalous) density, and corresponding to deconfined dynamics with broken valence chiral symmetry. We argue that such anomalous phase occurs quite generically in these theories, including in “real world” QCD above the crossover temperature, and in zero-temperature systems with many light flavors.

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