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Electrically-driven superextensivity for energy-efficient quantum technologies

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By leveraging quantum mechanical effects such as quantum coherence and entanglement, physical systems can be engineered to exhibit superextensive properties that scale greater than the sum of their parts. This offers distinct advantages over classical technologies and ushers in a desperately needed wave of energy-efficient quantum devices.

Here we present the experimental realisation and theoretical characterisation of two such devices that exhibit a quantum advantage over traditional energy storage and display technologies. In both cases, the cavity-induced molecular correlations enabling superextensivity, are intimately linked to the application of an electrical current to each device. To facilitate the discussion, we will present a heretofore unpublished theoretical model of charge transport in microcavity architectures.

These devices serve as an impactful example for how quantum effects can be employed to address aspects of global energy consumption without compromising device performance.

Theme

Theme 2. Quantum effects in energy processes and materials

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