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Quasicrystalline Charge Order JASPER VAN WEZEL, University of Amsterdam, The Netherlands, FELIX FLICKER, University of Bristol, U.K. — Incommensurate charge density waves occur in a large variety of materials in one, two and even three dimensions. As a function of decreasing temperature or applied pressure, the propagation vector characterizing such charge order typically evolves smoothly towards a commensurate value, before discontinuously jumping to a fully commensurate phase. This so-called lock-in transition is often explained in terms of a proliferation of discommensurations, which separate local regions of commensurate CDW within a globally incommensurate structure. Here, we argue that in strongly incommensurate systems with a sharply peaked electronic susceptibility, a second possibility exists. Rather than forming a regular array of discommensurations, we show that within an extended region of parameter space, the system may lower its free energy further by forming a quasicrystalline charge ordered state. The characteristic properties of this novel implementation of a quasicrystal, as well as its effect on the phase diagram and wave vector evolution of typical incommensurate charge ordered materials will be discussed.

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