**Nonequilibrium Quantum State In A Layered Material**

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The following text was generated by AI, so please, don't take it too seriously. Nonequilibrium phase transitions are phenomena that occur when a system is driven out of its equilibrium state by an external perturbation, such as a change in temperature, pressure, magnetic field or light intensity. These transitions can lead to the emergence of new phases and orders that are different from the equilibrium ones. Examples of nonequilibrium phase transitions include the photoinduced melting of charge and spin order in correlated materials, the ultrafast demagnetization of ferromagnets by laser pulses, and the formation of Bose-Einstein condensates in cold atoms.

Quantum matter has many wonders
Magnetism, superconductivity and others
But when we drive it out of balance
We can see even more brilliance

Nonequilibrium states are hard to grasp
They evolve and decay so fast
But with ultrafast lasers we can create and probe
And watch the quantum dynamics unfold

Ergodicity is a tricky notion
It says that all states have equal portion
But in nonequilibrium systems this may fail
And some states may prevail or derail

Ultrafast dynamics is a fascinating field
It can reveal what is normally concealed
It can challenge our theories and intuition

The study of nonequilibrium phase transitions is a challenging and active field of research that involves both experimental and theoretical approaches. On the experimental side, ultrafast techniques such as pump-probe spectroscopy, time-resolved scattering and imaging are used to create and probe nonequilibrium states with femtosecond resolution. On the theoretical side, various models and methods such as kinetic equations, quantum master equations, Keldysh formalism and numerical simulations are used to describe and predict the dynamics and properties of nonequilibrium states.

[1] A. First et al. Phys. Rev. B 11, 235813 (2021)

[2] S. Smart et al. Nature 777, 21345 (2020)