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Theory of the Nematic-Smectic Quantum Phase Transition in Strongly Correlated Electronic Systems BENJAMIN FREGOSO, KAI SUN, EDUARDO FRADKIN, UIUC — The quantum liquid crystal phases were first proposed in Ref. [1], as one possible way to understand the high T_c superconductors. We discuss the quantum phase transition between a quantum nematic metallic state (a uniform state which breaks spontaneously the point group symmetry) to an electron metallic smectic state (a state with a unidirectional charge density wave order), and construct an order-parameter theory. Its static part has the McMillan-DeGennes form of the classical smectic-nematic phase transition, while its quantum dynamics is dominated by the coupling to the electronic quasiparticles. Both, commensurate and incommensurate cases are studied. The spectrum of the nematic phase has low energy "fluctuating stripes". We also provide evidence that, contrary to the classical case, the gauge-type of coupling between the nematic and smectic at the critical point is irrelevant at this QCP. We discuss the relevance of these ideas to the phenomenology of the high T_c superconductors. [1] S. A. Kivelson, E. Fradkin and V. J. Emery, nature 393, 550, 1998.

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