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Quantum Criticality of the Two-dimensional Bose Gas with the Lifshitz dispersion CONGJUN WU, JIANDA WU, UC San Diego — Bosonic systems with the synthetic spin-orbit coupling and Zeeman field can be tuned into a quantum Lifshitz point exhibiting the q^4-dispersion. They are fundamentally different from the conventional ones with the q^2-dispersion, and are also connected to quantum frustrated magnets. We set up a generic quantum ϕ^4-theory at the Lifshitz point and investigate quantum critical behaviors at both zero and finite temperatures following the perturbative renormalization group method. Controlled by different fixed points, various physical quantities exhibit significantly different scalings from those of the conventional bosonic systems, exhibiting rich quantum critical physics in different interaction and temperature ranges.

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