

Panati, Gianluca**Triviality of Bloch and Bloch-Dirac bundles.** (English) Zbl 1375.81102

Ann. Henri Poincaré 8, No. 5, 995-1011 (2007).

Summary: In the framework of the theory of an electron in a periodic potential, we reconsider the longstanding problem of the existence of smooth and periodic quasi-Bloch functions, which is shown to be equivalent to the triviality of the Bloch bundle. By exploiting the time-reversal symmetry of the Hamiltonian and some bundle-theoretic methods, we show that the problem has a positive answer in any dimension $d \leq 3$, thus generalizing a previous result by *G. Nenciu* [Commun. Math. Phys. 91, 81–85 (1983; [Zbl 0545.47012](#))]. We provide a general formulation of the result, aiming at the application to the Dirac equation with a periodic potential and to piezoelectricity.

MSC:

- 81Q10** Selfadjoint operator theory in quantum theory, including spectral analysis
- 47F05** General theory of partial differential operators (should also be assigned at least one other classification number in Section 47-XX)
- 47N50** Applications of operator theory in the physical sciences
- 82D25** Statistical mechanical studies of crystals

Cited in **2** Reviews
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