

Mathematical Physics

Wannier functions, Bloch bundles and topological degree
theory

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Consider a real analytic and time reversal symmetric family of Bloch projections of rank N . We present a constructive proof for the existence of a corresponding Bloch basis, which is both real analytic and periodic with respect to its d -dimensional quasi-momenta when $1 \leq d \leq 3$ and $N \geq 1$. This basis is also time reversal symmetric, hence the corresponding exponentially localized composite Wannier functions are real. If time permits, we will show what goes wrong in dimension four and higher.

This is joint work with G. Nenciu (Bucharest) and I. Herbst (Charlottesville).