Seminario de análisis matemático y aplicaciones
Analisi matematikoa eta aplikazioak mintegia

Shell interactions for Dirac operators: on the point spectrum and the confinement

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ABSTRACT: Spectral properties and the confinement phenomenon for the coupling $H+V$ are studied, where $H=-i\alpha\cdot\nabla+m\beta$ is the free Dirac operator in 3d and V is a measure-valued potential. The potentials V under consideration are given in terms of surface measures on the boundary of bounded regular domains. A criterion for the existence of point spectrum is given, with applications to electrostatic shell potentials. In the case of the sphere, an uncertainty principle is developed and its relation with some eigenvectors of the coupling is shown. Furthermore, a criterion for generating confinement is given. As an application, some known results about confinement on the sphere for electrostatic plus Lorentz scalar shell potentials are generalized to regular surfaces. This is a joint work with N. Arrizabalaga and A. Mas.

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