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From the lowest sound of a drum to the lowest energy state of a hadron

Joaquim Duran i Lamiel

Universitat Politècnica de Catalunya i CRM

We study some spectral properties of generalized MIT bag models. These are a family of Dirac operators acting on domains of \mathbb{R}^3 , $\{\mathcal{H}_\tau\}_{\tau \in \mathbb{R}}$. They are used in the field of relativistic quantum mechanics to model confinement of quarks in hadrons, and their energies are related with the spectra of such operators. Their lowest positive eigenvalue is of special interest, and it is conjectured to be minimal for a ball among all domains of the same volume. The analogous conjecture holds true for the Dirichlet Laplacian (it is the Faber-Krahn inequality), which arises in the limit $\tau \rightarrow \pm\infty$. Studying the resolvent convergence of \mathcal{H}_τ in this limit, some spectral properties of the limiting operators $\mathcal{H}_{\pm\infty}$ are inherited throughout the parameterization.