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The Dixmier trace and the Density of States

The Dixmier trace has been employed by Connes for several purposes, including defining the integral in noncommutative geometry. Connes' integration formula can be viewed as a way of associating a measure to a self-adjoint operator. In solid state physics there is another celebrated measure associated with Schrodinger operators: the density of states. Using techniques from noncommutative geometry, we have recently proved that the density of states can in many cases be computed by a Dixmier trace. This work also provides a new perspective on Roe's index theorem for open manifolds by giving a Dixmier trace formula for the index. Joint work with N. Azamov, E. Hekkelman, F. Sukochev and D. Zanin.