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The energy representation has no non-zero fixed vectors. (English summary)

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22E65 (22E46 58J90 60H40 81R10)

Representations of groups of flows were systematically studied by Gel′fand, Graev and Vershik in the early 1970's.

In the present paper, the authors consider the smooth case. For a compact Riemannian manifold M without boundary, with dimension at least one and a compact connected Lie group G, they introduce the "gauge group" $\mathcal{G}$ of all smooth mappings of M into G.

The "energy representation" W of the "gauge group" is a specific unitary action on some extension of the Hilbert space H of all square integrable, $\mathfrak{g}$-valued 1-forms on M, where $\mathfrak{g}$ is the Lie algebra of G. It plays an important role in quantum field theory.

The main result of this paper claims that the energy representation W has no nonzero fixed vectors. In some cases (the dimension of M is greater than 1) this result follows from the irreducibility of W proved by Ismagilov, Gel′fand-Graev-Vershik, Albeverio-Hoegh-Krohn-Testard, or Wallach. The proof given in the paper under review applies in the general situation.

The method developed by the authors uses the Gaussian regular representation of the Euclidean group of a real separable Hilbert space.

{For the entire collection see MR 2001f:00037}

Reviewed by *Michel Pevzner*