Hyperbolic propagators and invariant subspaces of elliptic systems

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In my talk I will report on recent results about the spectral theory of elliptic systems on closed manifolds.

In the first part of the talk, I will present an explicit (i.e. up to solving ODEs), global (in space and in time) and invariant (under changes of local coordinates and gauge transformations that may be present) construction of wave propagators for first order systems, with a particular focus on the Dirac operator on a closed 3-manifold. The core of our approach is the theory of global Fourier integral operators with complex-valued phase functions developed by Laptev, Safarov and Vassiliev in the nineties.

In the second part of the talk, we will consider an elliptic pseudodifferential operator A of arbitrary positive order acting on m-columns of half-densities and discuss how one can partition its eigenvalues in precisely m (infinite) families, one for each eigenvalue of the principal symbol of A. Our results, which rely on the construction of an orthonormal pseudodifferential basis, allow us to refine two-terms asymptotic formulae for the eigenvalue counting function of A available in the literature. Furthermore, such a decomposition of the spectrum of A provides some additional insight into the above propagator construction.

Joint work with Dima Vassiliev (UCL).