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Chris Kottke*, Massachusetts Institute of Technology, Department of Mathematics, 77
Massachusetts Avenue, Cambridge, MA 02139-4307. *An Anghel-Callias index theorem and
monopole charges*. Preliminary report.

I will discuss a class of index problems that generalize a result by Callias concerning the index of a spin Dirac operator coupled to a skew-adjoint vector potential $D \otimes 1 + i \otimes \Phi$ on an odd-dimensional Euclidean space. The index turns out to depend only on the Chern character of the potential Φ over the sphere at infinity. A generalization to odd-dimensional noncompact manifolds was obtained by N. Anghel.

The first result is a K-theory formulation of an Anghel-Callias-type index theorem, permitting generalization to arbitrary self-adjoint elliptic pseudodifferential operators in the scattering calculus of Melrose, coupled to skew-adjoint potentials with appropriate invertibility and commutativity conditions at infinity. The index is entirely determined by symbolic and topological data over the manifold at infinity. I will also discuss some work in progress concerning the index of such operators when the potential Φ is not invertible at infinity, but merely has constant rank.

Finally I will mention applications to the moduli space of $SU(2)$ monopoles over a class of manifolds, where the index of the operator gives the dimension of the moduli. (Received August 31, 2009)