Meeting: 1001, Evanston, Illinois, SS 3A, Special Session on Index Theory, Morse Theory, and the Witten Deformation Method

1001-58-70 **Yuri Kordyukov**, **Varghese Mathai** and **Mikhail Shubin*** (`shubin@neu.edu`), Department of Mathematics, Northeastern University, 360 Huntington Ave., Boston, MA 02115. *Equivalence of spectral projections in semiclassical limit and a vanishing theorem for higher traces in K-theory.*

We obtain a refined L^2 version of the semiclassical approximation (with a large coupling constant) of projectively invariant elliptic operators with invariant Morse type potentials on covering spaces of compact manifolds. Using a new functional analysis technique, which possibly has a much wider applicability, we establish C^*-algebra equivalence between the spectral projections of the original quantum hamiltonian and a model hamiltonian which is a direct sum of harmonic oscillators corresponding to the wells of the scalar potential. This leads to an information about classes of these projections in K-theory (and not only about their traces). An important corollary is a vanishing theorem for the higher traces in cyclic cohomology, hence a proof that low energy bands do not contribute to the quantum Hall effect. As a by-product we obtain a new proof that there are arbitrarily many gaps in the spectrum in the semiclassical limit. (Received August 07, 2004)