1035-58-667   **Ruth Gornet*** (`rgornet@uta.edu`), Department of Mathematics, Box 19408 (411 S. Nedderman), Arlington, TX. *The wave invariants on Riemannian two-step nilmanifolds.*

We examine the length spectrum on two-step nilmanifolds toward determining what, exactly, the wave trace says about isospectral manifolds. In particular, for each length occurring in the length spectrum of a two-step nilmanifold, we compute the leading order term in the associated wave invariant, under the assumption of the clean intersection hypothesis. As an application, we explain certain examples of Heisenberg manifolds, constructed by C. S. Gordon (Contemporary Mathematics Vol 51, AMS) that are isospectral on functions, but have different multiplicities in the length spectrum. The multiplicity of a length is defined here as the number of free homotopy classes of loops that can be represented by a closed geodesic of that length. (Received September 18, 2007)