

# ON ISOVARIANT RIGIDITY OF CAT(0) MANIFOLDS, I AND II

QAYUM KHAN

In Part I, we discuss Quinn's equivariant generalization of the Borel Conjecture. This concerns cocompact proper actions of a discrete group  $\Gamma$  on a Hadamard manifold  $X$ . We give a complete solution when the action of  $\Gamma$  is pseudofree and when  $X$  more generally is a CAT(0) manifold. Here, pseudofree means that the singular set is discrete. A rich class of examples is obtained from crystallographic groups  $\Gamma$  made out of isometric spherical space form groups  $G$ .

If  $\Gamma$  has no elements of order two, then we obtain equivariant topological rigidity of the pair  $(X, \Gamma)$ . Hence, if  $\Gamma$  is torsion free, then we generalize a recent theorem of A. Bartels and W. Lück, which validates the classical Borel Conjecture for CAT(0) fundamental groups. Otherwise, if  $\Gamma$  has elements of order two, we show how to parameterize all possible counterexamples, in terms of Cappell's UNil summands of the  $L$ -theory of infinite dihedral groups.

This project is a joint work with Frank Connolly and Jim Davis.

In Part II, we discuss, in some detail, the new mixture of algebraic and geometric methods used to establish the results of Part I.

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF NOTRE DAME, NOTRE DAME,  
IN 46556 U.S.A.

*E-mail address:* [qkhan@nd.edu](mailto:qkhan@nd.edu)

*URL:* <http://www.nd.edu/~qkhan/>