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L-spaces and left orderability

L-spaces are three manifolds that arise naturally in the study of Heegaard Floer homology: these are manifolds with Heegaard Floer homology that is as simple as possible, or, Heegaard Floer homology lens spaces. A theorem of Ozsváth and Szabó establishes that L-spaces do not admit co-orientable taut foliations, and this fact suggests that one should search for an alternative characterization of these spaces (that is, a characterization that does not reference Heegaard Floer homology). Examples suggest that there is a correspondence between L-spaces and three manifolds with fundamental group that cannot be left-ordered. This talk will discuss how this correspondence is in fact a characterization when restricting to Seifert fibered spaces, that is, a Seifert fibered three manifold Y is an L-space if and only if the fundamental group of Y cannot be left-ordered. Another large class of L-spaces is provided by two-fold branched covers of the three-sphere, branched over an alternating link. In agreement with this correspondence, it is possible to prove that the two-fold branched cover of an alternating link has non-left-orderable fundamental group.

This is joint work with Steven Boyer and Cameron Gordon.