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Grigori Avramidi, Tam Nguyen Phan and **Yunhui Wu*** (yw22@rice.edu), Department of Mathematics, Rice University, 6100 Main Street, Houston, TX 77005. *Geometry and topology of noncompact, complete, finite volume, Riemannian 4-manifolds M with sectional curvature $-1 < K < 0$.*

We study noncompact, complete, finite volume, Riemannian 4-manifolds M with sectional curvature $-1 < K < 0$. We prove that $\pi_1 M$ cannot be a 3-manifold group. A classical theorem of Gromov says that M is homeomorphic to the interior of a compact manifold \overline{M} with boundary $\partial\overline{M}$. We show that for each π_1 -injective boundary component C of \overline{M} , the map i_* induced by inclusion $i: C \rightarrow \overline{M}$ has infinite index image $i_*(\pi_1 C)$ in $\pi_1\overline{M}$. We also prove that M cannot be homotoped to be contained in $\partial\overline{M}$. If time permitted, we will also discuss the topology for ends of $\partial\overline{M}$. The works are joint with Grigori Avramidi and Tam. N. Phan. (Received September 09, 2013)