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4.2 (CYLINDRICAL SPLITTING THEOREM).

If Γ is a hyperbolic group with $\text{Out}(\Gamma)$ infinite, and if Γ has one end, then Γ is either an HNN-extension or an amalgamated free product over a virtually infinite cyclic group.

Hyperbolic groups which do not admit a splitting over a virtually cyclic group have been termed *rigid* by Rips and Sela. They show, by a variant of the argument in Section 2 above (termed the Bestvina-Paulin method by Sela) that rigid hyperbolic groups are co-hopf. If Γ is torsion-free and rigid, then they show that there are only finitely many conjugacy classes of embeddings of Γ into any hyperbolic group. Sela [S2] has begun to investigate hopficity for rigid hyperbolic groups. Thus the techniques which we have attempted to exemplify in Section 2 appear to provide an extremely useful tool in the study of hyperbolic groups.

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