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Marc Culler* (culler@math.uic.edu), MSCS Department (M/C 249), University of Illinois at Chicago, 851 S. Morgan St., Chicago, IL 60607-7045, and **Peter B. Shalen**. *Four-free groups and hyperbolic geometry*.

We give new information about the geometry of closed, orientable hyperbolic 3-manifolds with 4-free fundamental group. As an application we show that such a manifold has volume greater than 3.44. This is in turn used to show that if M is a closed orientable hyperbolic 3-manifold such that $\text{vol}M < 3.44$, then $H_1(M; \mathbb{Z}/2\mathbb{Z})$ has dimension at most 7. (Received February 01, 2009)