

**Integer homology 3-spheres with large injectivity radius**  
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Conjecturally, the amount of torsion in the first homology group of a hyperbolic 3-manifold must grow rapidly in any exhaustive tower of covers. In contrast, the first betti number can stay constant (and zero) in such covers. Here "exhaustive" means that the injectivity radius of the covers goes to infinity. In this talk, I will explain how to construct hyperbolic 3-manifolds with trivial first homology where the injectivity radius is big almost everywhere by using ideas from Kleinian groups. I will then relate this to the recent work of Abert, Bergeron, Biringer, et. al. In particular, these examples show a differing approximation behavior for  $L^2$  torsion as compared to  $L^2$  betti numbers.