1108-57-586   **Rosemary K Guzman*** (`rosemary-guzman@uiowa.edu`), University of Iowa, Department of Mathematics, 14 Maclean Hall, Iowa City, IA 52242. *Special subgroups of hyperbolic 3-manifold groups.*

In the 1990's, Culler, Shalen, and their co-authors initiated a program to understand the relationship between the topology and geometry of a closed hyperbolic 3-manifold. I extend those results to the setting of hyperbolic 3-manifolds with $k = 5$-free fundamental group.

I have shown that the following geometric statement is true modulo the group-theoretic statement that proceeds it: Geometric Statement: If M is a closed, orientable, hyperbolic 3-manifold such that $\pi_1(M)$ is k-free with $k \geq 5$, then when $\lambda = \log(2k - 1)$, there exists a point P in M such that the set of all elements of $\pi_1(M, P)$ that are represented by loops of length less than λ is contained in a subgroup of $\pi_1(M)$ of rank $\leq k - 3$. Group-Theoretic Statement: Given two rank $m = k - 2$ subgroups of a free group whose intersection has rank $\geq m = k - 2$, their join must have rank $\leq m = k - 2$ ($m \geq 2$).

We will discuss a special case of the geometric statement, the $k = 5$ case, which I have shown is a theorem and discuss possible implications. (Received January 20, 2015)