1086-11-909 **Victor D Luo*** (vdl1@williams.edu), 4408 Jensen Place, Fairfax, VA 22032, and **Amanda Bower** and **Steven J Miller**. *Generalized Sum and Difference Sets and d-dimensional Modular Hyperbolas.*

Many problems in additive number theory, such as Fermat's last theorem and the Twin Prime conjecture, can be understood by examining sums of a set with itself. A finite set $A \subset \mathbb{Z}$ is considered sum-dominant if $|A+A| > |A-A|$. Although it may seem that most sets are difference-dominated since addition is commutative and subtraction is not, by controlling the fringes Martin and O'Bryant in 2007 proved a positive percentage are sum-dominant.

To see interesting behavior, the above results suggest looking at modular sets, as there are no fringes. Good choices arise from modular hyperbolas, $H_d(1;n) := \{(x_1, \ldots, x_d) : x_1 \cdots x_d \equiv 1 \bmod n\}$. In 2009, Eichhorn, Khan, Stein, and Yankov investigated the sizes of $\{x + x^{-1}\}$ and $\{x - x^{-1}\}$ where $x \in H_2(1;n)$. They proved results about the relative sizes of these restricted sum sets and difference sets, and also proved subsets of $\mathbb{Z}_n$ were in fact sum-dominated at least 84% of the time. We extend their results to d-dimensional modular hyperbolas. The key ingredients for the counting are Kloosterman sums, Hensel's lemma, and congruence theory. (Received September 15, 2012)