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Stefaan G. De Winter and **Zeying Wang*** (zeying@mtu.edu), Michigan Technological University, Houghton, MI 49931. *Classification of PDS in Abelian groups of order $4p^2$.*

Recently we proved a theorem for strongly regular graphs that provides numerical restrictions on the number of fixed vertices and the number of vertices mapped to adjacent vertices under an automorphism. We then used this result to develop a new technique to study regular partial difference sets in Abelian groups. As a application we here provide a complete classification of partial difference sets in Abelian groups of order $4p^2$, p an odd prime. It turns that the known examples are the only examples. These are, up to complements, the trivial examples, the PCP examples, and a sporadic example in $\mathbb{Z}_2^2 \times \mathbb{Z}_3^2$.

In this talk I will present the main ideas used in our proof. I will conclude the talk with some ongoing research and ideas for future research. (Received August 11, 2016)