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**Yesim Demiroglu Karabulut\*** ([yesim.demiroglu@rochester.edu](mailto:yesim.demiroglu@rochester.edu)). *Waring's Problem in Finite Rings.*

In this talk we apply some classical mathematics to extend results for Waring's problem to the context of general finite rings. Whereas there has been an extensive literature devoted to obtaining Waring type results over  $\mathbb{Z}/n\mathbb{Z}$ , over finite fields, and over certain kinds of matrix rings, we are not aware of any other such results in the context of general finite rings. We will start by explaining some fundamental Artin-Wedderburn theory and how one can use it together with a variant of Hensel's lemma to deduce sharp results for the Waring's problem over general (not necessarily commutative) finite rings by building on analogous results over finite fields. We will also present some elementary new proofs (using Cayley digraphs and spectral graph theory) for Waring results over finite fields, and explain how in the process of re-proving these finite field results, we obtain an original result providing an analogue of Sárközy's theorem in the finite field setting (showing that any subset  $E$  of a finite field  $\mathbb{F}_q$  for which  $|E| > \frac{q^k}{\sqrt{q-1}}$  must contain at least two distinct elements whose difference is a  $k^{\text{th}}$  power). (Received September 18, 2017)