Noah Kravitz* (noah.kravitz@yale.edu). Counting Simultaneous Core Partitions with $d$-Distinct Parts.

An integer partition is called $s$-core if its associated Young diagram has no hook of length $s$, and we say that an integer partition has $d$-distinct parts if its consecutive parts differ by at least $d$. In this talk, we investigate the number $N_{d,r}(s)$ of integer partitions with $d$-distinct parts that are simultaneously $s$-core and $s + r$-core. After reducing this problem to the enumeration of certain finite subsets of the natural numbers, we prove several results for the regime $r \leq d$, including a recurrence relation that was conjectured by Sahin in 2018. We also derive generating functions, asymptotics, and exact formulas for $N_{d,r}(s)$ when $r$ is within $d$ of a multiple of $s$. Finally, we exhibit a surprising connection to $A$-restricted compositions. (Received September 13, 2018)