1147-11-398 **Amanda Folsom**, **Min-Joo Jang**, **Sam Kimport** and **Holly Swisher***
(swisherh@math.oregonstate.edu). *Quantum modular forms and singular combinatorial series.*

In this talk, we consider the $(n+1)$-variable combinatorial rank generating function $R_n(x_1, x_2, \ldots, x_n; q)$ for n-marked Durfee symbols. These are $n+1$ dimensional multisums for $n > 1$, and specialize to the ordinary two-variable partition rank generating function when $n = 1$. The mock modular properties of R_n when viewed as a function of $\tau \in \mathbb{H}$, with $q = e^{2\pi i\tau}$, for various n and fixed parameters $x_1, x_2, \cdots, x_n$, have been previously studied. Namely, Bringmann and Ono considered when $n = 1$ and x_1 a root of unity; Bringmann considered when $n = 2$ and $x_1 = x_2 = 1$; Bringmann, Garvan, and Mahlburg considered when $n \geq 2$ and $x_1 = x_2 = \cdots = x_n = 1$; and Folsom and Kimport considered when $n \geq 2$ and the x_j are suitable roots of unity $(1 \leq j \leq n)$.

The quantum modular properties of R_1 follow from existing results. In our work, we prove for any $n \geq 2$ that the combinatorial generating function R_n is a quantum modular form when viewed as a function of $x \in \mathbb{Q}$, where $q = e^{2\pi i x}$, and the x_j are roots of unity.

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