Log-Concavity and the Bessenrodt-Ono Type Inequality for the Restricted Partition Function

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In 2015, DeSalvo and Pak reproved the result of Nicolas that the partition function $p(n)$ is *log*-concave for all $n > 25$:

$$p^2(n) > p(n+1)p(n-1).$$

One year later, Bessenrodt and Ono showed that for all positive integers $a, b \geqslant 2$ such that $a + b > 9$, we also have

$$p(a)p(b) > p(a+b).$$

Since then, the aforementioned results have been hugely generalized for another variations of partition functions — some of them will be discussed during the talk. However, the main part of the presentation will be devoted to these types of inequalities in the case of the so-called restricted partition function $p_{\mathcal{A}}(n, k)$ — that is the function which enumerates all partitions of a non-negative integer n with parts in a finite set $\{a_1, a_2, \ldots, a_k\}$, where $\mathcal{A} = (a_i)_{i=1}^{\infty}$ is an increasing sequence of positive integers.