We discuss the (non)unimodality of the rank-generating function, $F_\lambda$, of the poset of partitions \emph{into distinct parts} contained inside a given partition $\lambda$. This work, in collaboration with R. Stanley (European J. Combin., 2015), is in part motivated by an attempt to place into a broader context the unimodality of $F_\lambda(q) = \prod_{i=1}^{n}(1 + q^i)$, the rank-generating function of the “staircase” partition $\lambda = (n, n - 1, \ldots, 1)$, for which determining a combinatorial proof remains an outstanding open problem.

We will present several results on the $F_\lambda$. Surprisingly, they carry a striking similarity to those proven in 1990 by D. Stanton, who extended, to any $\lambda$, the study of the unimodality of $q$-binomial coefficients — that is, the rank-generating functions of the \emph{arbitrary} partitions inside rectangular partitions $\lambda$.

We will also discuss a few interesting conjectures and recent developments. These include a (prize-winning) paper by L. Alpoge, who solved our conjecture on the unimodality of $F_\lambda$ when $\lambda$ is the “truncated staircase” $(n, n - 1, \ldots, n - c)$, for $n \gg c$. 

Wednesday, September 20, 2017
4:15 p.m.
M.I.T. Room 2-135
http://math.mit.edu/seminars/combin/