Title: Combinatorics on integer partitions

Abstract:

Integer partitions were first studied by Euler.
The Ferrers diagram of an integer partition is a very useful tool for visualizing partitions. A Ferrers diagram is turned into a Young tableau by filling each cell with a unique integer satisfying some conditions.
The number of Young tableaux is given by the famous hook length formula,discovered by Frame-Robinson-Thrall.

In the present talk, we introduce the hook length expansion technique and explain how to find old and new hook length formulas for integer partitions. In particular, we derive an expansion formula for the powersof the Euler Product in terms of hook lengths, which is discovered by Nekrasov-Okounkov and Westburg. We also obtain an extension by adding two more parameters, which appears to be a discrete interpolation between the Macdonald identities and the generating function for t-cores. Several other summations involving hook length, in particular, the Okada-Panova formula, will also be discussed.