

The combinatorics of connected graphs

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In this talk, we present a recursive algorithm to generate all connected graphs. In particular, each graph is produced together with a weight factor given by the inverse of its symmetry factor. This algorithm is restricted subsequently to 1-particle irreducible graphs and to connected graphs without self-loops. Our method is based on three elementary operations on graphs, namely, i. attaching a self-loop to a vertex; ii. connecting a pair of adjacent vertices with an edge; iii. splitting a vertex in two, distributing the ends of edges ending on the split vertex, between the two new ones in all possible ways, and connecting the two new vertices with an edge.