

Quantum Mechanics of bipartite ribbon graphs and Kronecker coefficients

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I describe a family of algebras $K(n)$, one for every positive integer n , related to the group algebra of the symmetric group S_n . These algebras have a basis labelled by bi-partite ribbon graphs with n edges. They also have a decomposition into matrix blocks labelled by triples of Young diagrams with n boxes, with matrix block size equal to the Kronecker coefficient C for the triple. This leads to algorithms for the determination of sub-lattices in the lattice of ribbon graphs, of dimensions C^2 and C , equipped with bases constructed from null vectors of integer matrices. Some of the algorithms are realised in quantum mechanical systems where the quantum states are bipartite ribbon graphs. Using the known connections between bipartite ribbon graphs and Belyi maps, these quantum systems have an interpretation as models of quantum membranes.

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