



# NITheP Colloquium

Monday, 16 November 2020, 16h00

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## Quantum mechanics in combinatoric algebras, tensor models and Kronecker coefficients

**Abstract:** Group algebras of symmetric groups provide interesting examples of solvable quantum mechanical models where the Hilbert spaces have the additional structure of an associative algebra. Combinatoric operations based on multiplication of permutations define Hermitian Hamiltonians. Fourier transformation on the group algebras using representation theory enables the exact solution of the eigen-problems for the Hamiltonians in terms of characters and dimensions of irreducible representations of symmetric groups. These solvable quantum mechanical models admit generalisations involving other combinatoric algebras of interest in matrix and tensor models. Group-theoretic identities arising in the study of tensor model invariants motivate an approach to the combinatoric construction of Kronecker coefficients, which is based on quantum mechanics for permutation algebras related to ribbon graphs. This colloquium is based on the paper <https://protect-za.mimecast.com/s/mESiCy8k2Rt6VP78HP2eYy?domain=arxiv.org>

**Bio:** Dr Ramgoolam is a theoretical physicist working on string theory, representation theory and combinatorics. His work has focused on the development of algebras and representation theory as an approach to the study of gauge-string duality in the contexts of two-dimensional Yang Mills theory, the AdS/CFT correspondence, matrix models and tensor models. In recent inter-disciplinary work he has developed new matrix models for applications to computational linguistics. He holds the positions of Reader in theoretical physics at Queen Mary University of London and Visiting Professor at Wits University. He has previously been STFC Advanced Fellow and held post-doctoral positions at Princeton and Brown Universities.

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