Jointly organized by the Department of Physics and HK Quantum Institute of Science & Technology

CTCP SEMINAR

A 2D-CFT Factory: Critical Lattice Models from Competing Anyon Condensation in SymTO

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Room 522, 5/F, Chong Yuet Ming Physics Building,

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Abstract:

In this talk, we shall introduce a CFT factory – a novel algorithm of methodically generating 2D lattice models that would flow to conformal field theories (CFTs) in the infrared. We realise these models by engineering the boundary conditions of 3D topological orders (SymTOs) described by string-net models. The critical points are induced by a commensurate condensation of non-commuting anyons. Our structured method generates an infinite family of critical lattice models, including the A-series minimal models, and uncovers previously unknown critical points. Notably, we discover at least three novel CFTs (with central charge c around 1.3, 1.8, and 2.5) that preserves the Haagerup symmetries, in addition to recovering previously reported examples. The non-invertible symmetries preserved at these points are dictated by a novel "refined condensation tree". The condensation trees predict large swathes of phase boundaries and sieves out second order phase transitions. This predictive power is illustrated not only in well-studied examples, such as the 8-vertex model associated with the A5 category, but also in new cases involving Haagerup symmetries, validated by an improved symmetry-preserving tensor-network renormalization group method. The critical couplings are precisely encoded in algebraic data (the Frobenius algebras and quantum dimensions of unitary fusion categories), thereby establishing a powerful and systematic route to the discovery and potential classification of new CFTs.

ANYONE INTERESTED IS WELCOME TO ATTEND!

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