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Haldane relation for interacting dimers

In this talk, we present some recent results on the existence and nature of the scaling limit of interacting, close-packed, dimers on the two-dimensional square lattice. By constructive Renormalization Group techniques, we compute: the multipoint dimer correlations, which display non-trivial critical exponents, continuously varying with the interaction strength; and the height fluctuations, which, after proper coarse graining and rescaling, converge to the massless Gaussian field with a suitable interaction-dependent pre-factor ('amplitude'). We also prove the identity between the critical exponent of the two-point dimer correlation and the amplitude of this massless Gaussian field. This identity is the restatement, in the context of interacting dimers, of one of the Haldane universality relations, part of his Luttinger liquid conjecture, originally formulated in the context of one-dimensional interacting Fermi systems. Joint work with V. Mastropietro and F. Toninelli.