Bologna Workshop on:
CFT AND INTEGRABLE MODELS
and their applications to Quantum Field Theory, Statistical Mechanics and Condensed Matter Physics

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Large-N asymptotic expansion of multiple integrals related to the quantum separation of variables method

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The scalar products and certain correlation functions of models solvable by the quantum separation of variables
can be expressed in terms of N-fold multiple integrals which can be thought of as the partition function of a one dimensional
gas of particles trapped in an external potential V and interacting through repulsive two-body interactions of the type
$\ln\big[\sinh[\pi om_1(la-\mu)]\cdot\sinh[\pi om_2(la-\mu)]\big]$.
The analysis of the large-N asymptotic behaviour of these integrals is of interest to the description of the continuum limit of the
integrable model.
Although such partition functions present certain structural resemblances with those arising in the context of the so-called
be-ensembles,
their large-N asymptotic analysis demands the introduction of several new ingredients. Such a complication in the analysis
is due to the lack of dilation invariance of the exponential of the two-body interaction.
In this talk, I shall discuss the main features of the method of asymptotic analysis which we have developed.
The method utilises large-deviation techniques on the one hand and the Riemann–Hilbert problem approach to
truncated Wiener-Hopf singular-integral equations on the other hand.
This is a joint work with G. Borot and A. Guionnet.

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