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On the Duality of Quantum Liouville Field Theory

L. O'RAIFEARTAIGH, J. M. PAWLOWSKI and V. V. SREEDHAR
Dublin Institute for Advanced Studies
e-mail: physics@stp.dias.ie

Abstract: It has been found empirically that the Virasoro centre and 3-point functions of quantum Liouville field theory with potential $e^{2b\phi(x)}$ and external primary fields $\exp(\alpha\phi(x))$ are invariant with respect to the duality transformations \hbar α\rightarrow q-α where q=b^{-1}+b. The steps leading to this result (via the Virasoro algebra and 3-point functions) are reviewed in the path-integral formalism. The duality stems from the fact that the quantum relationship between the α and the conformal weights $\Delta_\backslash$alpha is two-to-one. As a result the quantum Liouville potential may actually contain two exponentials (with related parameters). It is shown that in the two-exponential theory the duality appears in a natural way and that an important extrapolation which was previously conjectured can be proved.