

## Quantum KdV and quasimodular forms

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A result of Dubrovin provides a full description of the spectrum of the dispersionless quantum Korteweg-de Vries (qKdV) hierarchy (in the first Poisson structure). Eigenvalues are shifted-symmetric functions of partitions, related, by a result of Bloch and Okounkov, to quasimodular forms on the full modular group  $SL(2, \mathbb{Z})$ . We extend this relation to the dispersive case by showing that  $q$ -weighted traces of the Hamiltonian operators of the qKdV (in the first Poisson structure) are quasimodular of homogeneous weight. This is achieved by first establishing a general criterion for quasimodularity, which remarkably simplifies the recursion formula (in the form obtained by Buryak and Rossi) for the qKdV Hamiltonian densities. These results naturally extend to the Intermediate Long Wave hierarchy. Joint work with Jan-Willem van Ittersum.

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