

SUFFICIENCY CONDITIONS FOR QUANTUM REFLECTION

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The term “Quantum Reflection” in its original usage by Brenig in 1980 was limited strictly to the scattering of atoms from solid surfaces as governed by a long-range power law (van der Waals) interaction potential. This talk will explore asymptotic forms of the 1D Schrödinger equation in that instance, to show that sufficiency conditions for such Quantum Reflection can be developed in terms of characteristic length scales of the scattering problem. Provided the gas-surface potential does not support a tenuous (near zero energy) bound state, the only physical parameters to enter are the exponent and dispersion coefficient of the relevant power law dependence. This allows an upper wavevector bound to be set on the Quantum Reflection regime for any scattering system in which these two parameters are known. For most physical systems of interest, this critical wavevector is quite small, 10^{-3} \AA^{-1} or less.