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Motion of an impurity in a one-dimensional quantum liquid AUSTEN LAMACRAFT, University of Virginia — We consider the motion of an impurity particle in a general one-dimensional quantum fluid at zero temperature. The dispersion relation $\Omega(P)$ of the impurity is strongly affected by interactions with the fluid as the momentum approaches $\pm\pi\hbar n, \pm 3\pi\hbar n, \ldots$, where n is the density. This behavior is caused by singular $\pm 2\pi\hbar n$ scattering processes and can be understood by analogy to the Kondo effect, both at strong and weak coupling, with the possibility of a quantum phase transition where $\Omega'(\pm\pi n)$ jumps to zero with increasing coupling. The low energy singularities in the impurity spectral function can be understood on the same footing.

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