Dynamics of Fermionic Impurity in One Dimension HUIJIE GUAN, NATAN ANDREI, Rutgers University — We study the dynamics of a fermionic impurity propagating in a one dimensional infinite line. The system is described by the Gaudin-Yang Model and is exactly solvable by the Nested Bethe Ansatz. Starting from a generic initial state, we obtain the time evolution of the wavefunction by the Yudson Approach in which we expand the initial state with the Nested Bethe Ansatz solutions. One situation that we are interested in is where, initially, the impurity is embedded in host fermions with a lattice configuration and one remove the periodic potential at time zero. We calculate the density profile and correlation functions at a later time. Another situation is to shoot an impurity into a cloud of fermions and calculate the probability for it to pass through. While the repulsive case has been studied already[1], we extend it to the attractive case and study the role of bound states in the evolution. We are also interested in boson impurity problem, where not only impurity interacts with host particles, all host particles interact with each other.

[1] C. J. Mathy and M. B. Zvonarev and E. Demler, Nature Physics **8**, 881(2012)

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