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Bound state in the continuum in a quantum wire[1] LUIZ H. GUESSI, Univ de Sao Paulo, ANTONIO C. SERIDONIO, Univ Estadual Paulista, LUIZ N. OLIVEIRA, Univ de Sao Paulo — Bound States in the Continuum (BICs) are states with localized wave-functions even though lying in the continuum. Such states occur because two or more wave-functions or resonances interfere destructively. Here, we theoretically study the emergence of BICs in a quantum wire with two side-coupled adatoms. The adatoms are decoupled from each other, but both are coupled to (i) the same adsorption site and (ii) the two neighboring sites. We employ the spin-degenerate Anderson Hamiltonian to model the system. In the Hubbard I approximation, we have analytically found two BICs associated to the singly- and doubly-occupied impurity levels. To more accurately describe the Coulomb interaction, we have also computed the spectral density with the Numerical Renormalization Group method. The numerical results confirm the presence of the two BICs and, in addition, show the expected Kondo peak at the Fermi level. We have checked that (a) in the absence of Coulomb interactions and (b) for two impurities coupled to the adsorption site only, the BICs leak into the continuum.

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