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Adsorption of atomic Fe-clusters on superconducting Pb

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Due to their potential use as topological qubits in quantum computers, Majorana bound states (MBS) have attracted a large interest in Physics. Recent experiments at low temperature (< 5 K) have shown that iron chains grown on lead surfaces exhibit zero-bias conductance peaks at their ends [1,2,3,4], which can be interpreted as signature for a MBS [5].

Here, we investigate the internal structure and adsorption sites of small iron clusters evaporated on lead surfaces. Combining scanning tunneling microscopy (STM), scanning tunneling spectroscopy (STS) and atomic force microscopy (AFM), we characterize the structural and electronic properties at the atomic scale. This can be used as fundamentals for fabrication methods of iron chains on lead with atom-by-atom manipulation.

[1] Nadj-Perge, S. et al.; Science 346, 602 (2014) [2] Ruby, M. et al.; Phys. Rev. Lett. 115, 197-204 (2015) [3] Pawlak, R. et al.; npj Quantum Information, 16035 (2016) [4] Feldmann, B.E. et al.; Nature Physics 13, 286-291 (2017) [5] Mourik, V. et al.; Science 336, 1003 (2012)

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