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Scanning Probe Spectroscopy of Individual Dopants in Silicon
MOREWELL GASSELLER, MATTY CAYMAX, ROGER LOO, SVEN ROGGE, STUART TESSMER — A key goal of semiconductor nanoelectronics is to develop devices based on manipulating the charge and spin of individual dopant atoms. Elucidating the quantum structure of these minute systems is a difficult technical challenge. Here we present capacitance-based scanned-probe measurements that both spatially-resolve individual subsurface boron dopants in silicon and detect spectroscopically single holes entering the B+ state of these atoms. We observe that, on average, acceptors with a closer nearest neighbor exhibit stronger binding. This finding is consistent with the interpretation of resonant tunneling measurements performed on a similar sample.

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