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Quantum states of interacting point defects in silicon STEVEN SCHOFIELD, HOLLY HEDGELAND, MANUEL SIEGL, DAVID BOWLER, University College London — We investigate point defect induced quantum states on silicon surfaces using low temperature scanning tunneling microscopy and spectroscopy (STM/STS). We compare defect states produced at missing H atom sites on the Si(001):H monohydride surface and those formed at boron deficient sites of the B-saturated Si(111):B-$\sqrt{3} \times \sqrt{3}R30^\circ$ surface. We find good agreement between measured differential conductance and first principles calculations of the states. Furthermore we explore the interaction of pairs of defects in a range of varying close proximity arrangements and find non-linear interference between the laterally extended excited states of the point defects. The results support the interpretation of interacting excited states as we have presented previously [Nature Communications 4 (2013) 1649].

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