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Unintentional Quantum Dots in Silicon: Deducing the Location and Cause TED THORBECK, NIST and University of Maryland: JQI, CNAM, NEIL M. ZIMMERMAN, NIST — When attempting to use local gates to electrostatically define quantum dots in silicon, additional unintentional quantum dots (U-QDs) that are not defined by the gates are often observed. U-QDs are typically blamed on random charged defects such as dopants or interface traps. We use measured gate capacitances and a capacitance simulator to determine the location of the U-QDs with a precision of a few nanometers. Since we have observed U-QDs in similar locations in multiple devices, we suggest that some U-QDs are not caused by random charged defects instead are a systematic but unanticipated consequence of the fabrication. We will discuss strain as a potential cause of the U-QDs. This allows us to suggest methods to reduce the frequency of U-QDs in future devices. Given the variety of groups suffering from U-QDs and the simplicity of this technique, we think that many groups might benefit from our methods.

X Prefer Oral Session
Prefer Poster Session

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