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**A Microscopic Model for Interacting Two-Level-Systems in an  $\text{Al}_2\text{O}_3$  Insulating Barrier** VICTOR GALITSKI, MAXIM DZERO, University of Maryland — We develop a generic theoretical model of interacting two-level systems (TLS) in  $\text{Al}_2\text{O}_3$  dielectric and use it to analyze anomalous experimental data in superconducting qubits. Interactions between the TLS are mediated by local strains from neighboring atoms as well as electrons from the superconducting contacts. Our analysis is particularly focused on how the between the TLS affect the quality factor of superconducting circuits. This work is financially supported by IARPA.

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