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Effect of radiation and temperature on resonance properties of polyurethane-coated wire bonds. YENHO CHEN, Author, JOE IZEN, Principle Investigator — Aluminum wedge wire bonds are used in the silicon pixel detectors that compose the innermost section of the Large Hadron Collider (LHC). Wire bonds are susceptible to failure due to mechanical oscillations from periodic Lorentz forces and condensation induced corrosion. The proposed solution is to coat wire bonds with a thin layer of polyurethane (PU) for structural reinforcement and oscillation dampening. Coating robustness is evaluated by exposing samples to the lifetime radiation dosages expected in the High Luminosity LHC and by thermal-cycling to test for radiation-induced intolerance to thermal expansion. Mechanical properties of wire bonds were tested by exciting PU-coated wire bonds with 50% duty cycle square wave currents in a 1.0T field. Wire bonds were configured to simulate the most vulnerable endcap disk geometry. Resonance characteristics were measured up to anticipated lifetime doses.

Yenho Chen
Author

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