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# DESIGN AND ANALYSIS OF A CRYSTALLINE SILICON TRIANGULAR VERTICAL SPRING BLADES-CRYOGENICS SUSPENSION SYSTEM FOR THE EINSTEIN TELESCOPE

This study focuses on optimizing crystalline silicon triangular blade springs for the vertical suspension system of the Einstein Telescope (ET) to enhance cryogenic performance. By leveraging silicon's high Q-factor and thermal conductivity, the design minimizes thermal noise and ensures efficient heat dissipation at low temperatures. Structural integrity is improved through material selection and flexible joints, reducing thermal stress and mechanical mismatches. The blades are optimized for vibration isolation, ensuring precise alignment and stability. Using ANSYS simulations and Finite Element Analysis (FEA), key parameters like length, width, and thickness are refined, while experimental validation via wire electrical discharge machining (WEDM) confirms simulation predictions. A dual-load approach examines the impact of crystalline orientations, enhancing design flexibility. The results highlight potential improvements in noise attenuation, contributing to future advancements in precision instrumentation and gravitational wave detection.

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