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Tales from the Stellar Graveyard: How Dead Stars Reveal New Physics

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Axions, hypothetical particles born in QCD and long suspected to help make up dark matter, are usually thought to slip through the universe unnoticed. But when matter is squeezed to the extreme densities found in white dwarfs and neutron stars, these "invisible"particles can leave unmistakable fingerprints. I will sketch how the ultra dense interiors of such stellar remnants reshape axion behavior, alter the balance of forces inside the star, and drive energy loss processes that ripple out to supernovae and beyond. By treating the cosmos's most compact objects as natural laboratories, we gain new ways to test axion ideas, complementing lasers, traps, and colliders on Earth. The talk will outline this new frontier and its implications for dark matter searches and dense matter theory.

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