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X-ray Searches for Axions from Nearby Isolated Neutron Stars

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Axions may be produced thermally inside the cores of neutron stars (NSs), escape the stars due to their weak interactions with matter, and subsequently convert into X-rays in the magnetic fields surrounding the NSs. I will describe a hard X-ray search from 2 - 8 keV for X-rays arising from this emission mechanism from the nearby Magnificent Seven isolated NSs using archival XMM-Newton and Chandra data. This search leads to the strongest limits to-date on the product of the axion-photon and axion-nucleon couplings for axion masses below 1e4 eV. Moreover, I will show that an observed excess of hard X-rays from the Magnificent Seven may arise from axions. I will discuss near-term measurements and analyses to help rule out or confirm this possibility, including preliminary results from a search with NuSTAR data for axion-induced X-rays from nearby star clusters.