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Looking for Massive ALPs from SN1987A with Cherenkov Detectors

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In this talk I present new constraints on the axion-nucleon coupling g_{aNN} for massive ALPs using SN1987A. Standard arguments that restrict the energy loss of core-collapse supernovae are used, and novel bounds from modern water Cherenkov detectors are derived for axion masses in the MeV range. Recasting the invisible nucleon decay data of SNO+, a new exclusion limit can be found in the range of $7.7 \times 10^{-7} \text{ GeV}^{-1}$ to $5.0 \times 10^{-4} \text{ GeV}^{-1}$ for masses between 170 keV and 400 keV. Thus, water Cherenkov detectors allow to extend the constraints by roughly three additional orders of magnitude.

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