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Axion Production and Detection using Superconducting RF cavities

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We propose a "Light Shining Through Walls"-type experiment to search for axions with high-Q superconducting RF cavities. Our setup uses a gapped toroid to confine a static magnetic field, with production and detection cavities positioned in regions of vanishing external field. We argue that the confining toroid does not significantly screen the axion-induced signal for frequencies of order the inverse toroid size. This allows both cavities to be superconducting with quality factors $Q \sim 10^{10}$, thus significantly improving the sensitivity of the experiment. Such a search has the potential to probe axion-photon coupling $\sim 2 \times 10^{-11}$ GeV^{-1} , comparable to the future ALPS II.

Presenter: NARAYAN, Vijay (UC Berkeley)

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