

# Hybrid cavities for axion detectors

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Hybrid cavities, cavities with a layer of superconductor applied on top of the OFHC copper cavity walls, are studied. The goal is to improve the quality factor ( $Q$ ) of the resonator. The superconductor must have its surface parallel to the external field and must be thinner than the penetration depth and comparable in thickness to the fluxoid spacing in the type II superconductor at the 8 T operating field.  $Q$  for a single thin layer and of a multilayer superconductor/ insulator stack applied directly to the copper are estimated. The results for these thin-film coatings are not good. However, if a layer or a multilayer stack of the superconductor were separated from the copper by a thick insulating spacer, one that is about a quarter wavelength at the cavity resonant frequency, extremely high  $Q$  factors could be obtained. Even when the contribution of the normal metal ends (where the external field is perpendicular to the surface) is included, the  $Q$  is improved compared to an all-metal cavity.

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