

# Superconducting YBCO microwave cavity in a high magnetic field for axion dark matter search

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Maintaining high Q-factor of the superconducting cavity in a strong magnetic field at gigahertz frequencies is a crucial component in a highly sensitive axion detection system and at the same time, a largely unexplored and challenging task. The natural choice of material for the superconducting cavity to be placed in a high magnetic field is a high-temperature superconductor (HTS) with a high critical field ( $>100$  T) and a high depinning frequency ( $>10$ GHz). The deposition, however, of a high-quality, grain-aligned HTS film on a three-dimensional surface is technically difficult. IBS/CAPP has fabricated a polygon-shaped resonant cavity with commercial YBCO tapes covering the entire inner wall and measured the Q-factor at 4 K at 6.9 GHz as a function of an external DC magnetic field. We present the microwave measurement of the YBCO cavity (TM<sub>010</sub> mode) which shows that the Q factor of the cavity do not degrade until 8 Tesla. This result indicates the possibility of realizing a high Q-factor superconducting cavity in a high magnetic field for axion search.

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