

Active circuits for resonant axion detectors

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The key difficulty taking cavity axion detectors forward is the rate of coverage of possible axion masses. With metal cavity boundary conditions determining the modal frequencies, you are limited to the physical modes of the cavity having a high form factor. We examine whether artificial modes generated by feedback through high Q resonant filters outside the cavity could form artificial high-Q modes. Running many of these filters in parallel could generate a picket fence of modes, which might for some configurations allow one to multiply the search rate by the number of these artificial modes. We examine the practicalities of implementing these external resonators including their noise contribution and the question of their behaviour in the quantum limit.

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