

Cavities march in step

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To reach high frequencies while maintaining a good B^2V , the axion detector will require either a complex multi-cell structure or the operation of a number of cavities together. In order to employ a number of cavities that are power-combined in phase, the cavity resonant frequencies will need to be identical. This talk outlines a technique developed by Pound to lock a klystron to a resonator and elaborated by Drever and Hall for locking lasers to optical resonators. This Pound-Drever-Hall method is widely used, notably by LIGO, to maintain lock of up to five resonant lengths. It employs phase modulation of the electromagnetic waves incident on the cavity, followed by mixing of the generated sidebands with the reflected carrier, and then by phase-sensitive demodulation to generate an error signal. The error signal may be used in a servo loop to adjust the cavities' resonant frequency.

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