

# Windchime: Gravitational Detection of Dark Matter with Mechanical Sensors

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The Windchime experiment endeavors to directly detect dark matter through its gravitational interaction alone. Current direct dark matter searches rely on the possibility of much stronger non-gravitational interactions of dark matter with ordinary matter. However, dark matter is only guaranteed to interact gravitationally. At a well-motivated mass range of  $10^{19}$  GeV, it is conceivable to detect the gravitational impulse of a passing particle. We pursue four avenues of technological development to achieve gravitational sensitivity: sensor development and production, environmental isolation, quantum noise reduction, and computing with large data sets for track finding. Ultimately, Windchime will consist of an array of  $10^9$  optomechanical accelerometers operating at their thermal noise limit in ultra-high vacuum at 10mK, so that passing heavy dark matter particles are recorded as tracks in the array.

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