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Superconducting GW detectors targeting 10^{-30} $Hz^{-1/2}$ strain sensitivity at 100 Hz ARMEN GULIAN, Chapman University, JOE FOREMAN, Private Researcher, VAHAN NIKOGHOSYAN, LOUIS SICA, Chapman University, SHMUEL NUSSINOV, Chapman University/Tel-Aviv University, JEFF TOLLAKSEN, CHRIS BURDETTE, RAJENDRA DULAL, SERAFIM TEKNOWIJOYO, SARA CHAHID, Chapman University — A design of compact (<100 m in size) orbital detector of gravitational wave (GW) radiation with sensitivity up to 10^{-30} $/Hz^{1/2}$ at and below 100 Hz is reported. The detector is not interferometric and uses superconducting Cooper pairs in magnetic field as transducers of GW-induced mechanical motion into electric current. Compactness yields ability to aim these portable detectors toward the source of GW, maximizing signal output and determining the direction of the source with high accuracy. The main idea of this design exploits the fact that an incident GW shifts infinitesimally the orientation of a 3D-superconducting system relative to a magnetic field. This minute change of orientation breaks the inherent symmetry of the Meissner current flowing on the surface layers of the superconducting system, thus serving as a "valve regulator" for the Meissner current flow. As a result, a current strong enough to be detected by means of superconducting electronics is being generated by the GW action. The inherent quietness of superconducting state is complemented by additional means, such as digital noise cancellation using second immobile system and noise filtering. The whole system acts as an amplified source of the current which is proportional to the amplitude of GW, similar to LIGO.

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