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A new approach to ultrasensitive gravitational wave detection ARMEN GULIAN, Chapman University, JOE FOREMAN, Independent Researcher, VAHAN NIKOGHOSYAN[1], LOU SICA, JEFF TOLLAKSEN, SHMUEL NUSSINOV[2], Chapman University — Recently LIGO detected gravitational waves using interferometric methods. A different approach is proposed here. It is based on: 1) conversion of the wave action into rotational motion and 2) subsequent conversion into electric current. Instead of a large number of photons, here the large density of charge carriers (Avogadro number per cubic centimeter) results in an electronic current signal with intrinsically low noise. The noise is low because in superconductors used in the proposed design, the Cooper-pairs behave like a Bose-Einstein condensate with extremely low fluctuations. Preliminary estimates suggest that strain sensitivities exceeding those of advanced LIGO can be achieved with table-top instruments. The suggested toroidal design with magnetic frame will achieve $2 \cdot 10^{-25} Hz^{-1/2}$ at the frequency of $\nu \approx 100 Hz$ for a 10 Ton, 10 $meter$radius torus with 1 $meter$ cryogenic frame. This exceeds the advanced LIGO sensitivity (in the range of LIGO's maximum sensitivity) by two orders of magnitude. For both higher and lower frequencies, the improvement is considerably larger. For example, at $\nu \approx 1\ kHz$ there is a $3,000$fold improvement. For lower frequencies the improvement can be very much larger, even for the lighter smaller100 kg, 1 $meter$ torus devices.

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