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Exploring Vacuum-Gravity Interaction through the Archimedes Experiment: Recent Results and Future Prospects

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The goal of the Archimedes experiment is to investigate the role of the interaction between the vacuum fluctuations and gravitational field. This will be possible thanks to a high sensitivity and cryogenic balance installed in the SarGrav laboratory in the Sos Enattos mine (Sardinia), the Italian candidate site for the third generation gravitational wave observatory Einstein Telescope. Archimedes will measure the small weight variations induced in two high temperature superconductors that have the property of “trapping” or “expelling” vacuum energy when their temperatures are greater or lower than their critical temperatures. Only the radiative heat exchange mechanism must be used to remove or add thermal energy to the sample as it must be isolated from any external interaction that could add energy other than the vacuum one. The status of the experiment will be illustrated together with the most recent results.

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