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Recent Progress in Neutrinoless Double Beta Decay: Its Forecast for the Future

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At least one neutrino has a mass of about 50 meV or larger. However, the absolute mass scale for the neutrino is unknown. Furthermore, the critical question: Is the neutrino its own antiparticle? remains unanswered. Studies of double beta decay offer hope for determining the absolute mass scale. In particular, zero-neutrino double beta decay ($\beta\beta(0\nu)$) can address the issues of lepton number conservation, the particle-antiparticle nature of the neutrino, and its mass. Recent experimental results have demonstrated the increasing reach of the technologies used to search for ($\beta\beta(0\nu)$. In addition, theoretical progress in understanding the nuclear physics involved has also been impressive. All indications are that upcoming generations of ($\beta\beta(0\nu)$ experiments will be sensitive to neutrino masses in the exciting range below 50 meV. A summary of the recent results in ($\beta\beta(0\nu)$ will be discussed in the context of the future ($\beta\beta(0\nu)$ program.