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JUNO's R&D Program for Neutrinoless Double Beta Decay

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It is extremely important for future neutrinoless double-beta ($0\nu\beta\beta$) decay experiments to reach a sensitivity to effective Majorana neutrino mass $|m_{\beta\beta}|$~meV. At this level, the determination of neutrinos' Majorana nature, absolute masses and the constraints on one of two Majorana CP phases are possible, which will provide profound insights into understanding the neutrino mass origin and the observed matter-antimatter asymmetry in our Universe. The Jiangmen Underground Neutrino Observatory (JUNO), which has the largest liquid scintillator (LS) detector with extremely low background and excellent energy resolution, will be online soon. JUNO has great potential to be upgraded to search for $0\nu\beta\beta$ and to reach a sensitivity of $|m_{\beta\beta}|$~meV after its primary mission on the determination of neutrino mass ordering and the precision measurements of oscillation parameters is accomplished. The dedicated R&D program focused on the LS doping with a suitable $0\nu\beta\beta$-decaying isotope and the purification, as well as on the development of advanced techniques for background rejection, are being carried out in the past and forthcoming years. If successful, JUNO could be ready to begin searching for $0\nu\beta\beta$ decays at the turn of the next decade. This talk will report the up-to-date R&D progresses on Tellurium-doped LS development and the studies on the cosmogenic backgrounds on Tellurium.

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