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The R&D progress of the Jinping Neutrino Experiment

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The Jinping Neutrino Experiment will perform an in-depth research on solar neutrinos, geo-neutrinos and supernova relic neutrinos. Many efforts were devoted to the R&D of the experimental proposal. A new type of liquid scintillator, with high light-yield and Cherenkov and scintillation separation capability, is being developed. The assay and selection of low radioactive stainless-steel (SST) was carried out. The U and Th concentration is less than 1e-8 g/g for selected SST samples. A wide field-of-view and high-efficiency light concentrator is developed. Previous designs of light concentrators were optimized to attain a wide field view, 90 degree and a high efficiency, above 98%. At the same time a 1-ton prototype is constructed and placed underground at Jinping laboratory to 1) test the performance of several key detector components, like acrylic, pure water, using of ultra-high molecular weight polyethylene rope, 2) understand the neutrino detection technology with liquid scintillator and slow liquid scintillator and 3) measure the in-situ Jinping underground background, like fast neutron. The design, construction and initial operation of the 1-ton prototype will be discussed. A simulation framework is also developed to facilitate the experimental study of the 1-ton prototype and future detector design.

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