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Benefits of and progress towards massive water-based liquid scintillator detectors

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Recent research and development towards Water-based Liquid Scintillator (WbLS) appears to suggest that such materials can be made stable and economical in large quantities. This opens the possibility to detect low energy particles below the Cherenkov threshold that are inaccessible to a water Cerenkov detector. It also enhances the scientific agenda of future large water Cherenkov detectors. Preliminary results of WbLS performance will be presented as well as simulation results for a massive detector. Simulation shows that, based on expected WbLS performance, the sensitivity to proton decay to K+,nu would be increased by over a factor of six with respect to a water Cherenkov detector. Use of a smaller WbLS-based detector suitable for a near site will be discussed. The viability of filtration at different pore sizes will be reported. Feasibility tests for UV stabilizer, reverse osmosis, and degasifier stages are planned.

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