

# Mixing and Purification of Master Solution for JUNO

*Friday, 21 June 2024 17:30 (2 hours)*

Producing 20,000 tons of ultra-pure liquid scintillator poses one of the most challenges for the Jiangmen Underground Neutrino Observatory (JUNO). The three components of the liquid scintillator—linear alkylbenzene (LAB), 2,5-diphenyloxazole (PPO), and 1,4-bis(2-methylstyryl) benzene (bis-MSB)—do not meet the strict radioactive content standards upon purchase from suppliers, necessitating the implementation of purification stages. To address this issue, a comprehensive on-site liquid scintillator production and purification system that incorporates several facilities was developed and constructed. The crucial task of purifying PPO and bis-MSB is assigned to the mixing system. This process begins with dissolving PPO and bis-MSB in LAB to create a highly concentrated master solution, subsequently decontaminated of radioactivity through comprehensive acid extraction and filtration processes. Following purification, the master solution undergoes online dilution to produce the liquid scintillator, subsequently transported to the underground laboratory. This poster aims to elucidate the mixing and purification processes of the master solution, detailing the composition of raw materials and radioactive content specifications, as well as the design, parameters, and distinctive construction features of the mixing system, while highlighting the successes of joint commissioning efforts. Results from joint commissioning have demonstrated that this methodology significantly reduces the radioactive content of the master solution by two orders of magnitude, marking a considerable advancement for JUNO.

## Poster prize

No

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