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World's most powerful pulsed Lyman-αlight source for Ultra-slow muon generation

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The world's most powerful pulsed Lyman-α light source has been constructed at J-PARC, enabling research on the ultra-slow muon generation and its applications. To date, however, there have been no reports on the long-term generation and utilization of high-intensity Lyman-α pulse. In this study, we investigated the generation and propagation process and examined the impact of time-dependent degradation of the optical components employed. The reduction in available Lyman-α intensity was found to originate primarily from the deterioration of the Kr–Ar gas mixture used for nonlinear wavelength conversion and from the degradation of optical components caused by the vacuum window and residual gases in the chamber.

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