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Development of 2 stage Ultra-slow muon generation target toward Muon transmission microscope

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High-efficiency muonium production targets are a key element in research utilizing ultra-slow muon (USM) generation, such as the g-2/EDM experiment and transmission muon microscope. In particular, applications like transmission muon microscope require not only small-emittance sources, traditionally realized with planar silica aerogels, but also spatial convergence of USM beams. To address this need, we propose a novel 2 stage USM source based on engineered silica aerogel targets designed to achieve spatial focusing. We also present the development of femtosecond laser microfabrication techniques for precise surface structuring of aerogels, which are expected to enhance muonium emission yields and beam convergence.

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