

Observation of Muonium Vacuum Emission from Mesoporous Silica Film

Kim Siang, Khaw

Institute for Particle Physics, ETH Zurich, Switzerland

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Abstract

Muonium ($\text{Mu}=\mu^+e^-$) is used in Mu spectroscopy for extracting fundamental constants (m_μ , α , R_∞), and for testing bound-state QED theories. However, the precision is limited by the lack of a high quality Mu source, in terms of vacuum yield, low energy and reliability.

Based on the analogy of Positronium-Muonium formation, the Mu vacuum yield may be as high as 40% in the Mesoporous Silica Film. For that reason, we created samples designed for Muonium formation and tested them at PSI using the μE4 beamline in June 2011.

In this paper, I report the preliminary results of the measurements and the prospects in the future.