QUARTET:
High-Resolution X-ray Spectroscopy of Light Muonic Atoms

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The low-lying energy levels of muonic atoms are highly sensitive to nuclear structure because of the strong overlap of the muon wavefunction with the nucleus. In particular, the energy of the muonic $2p$–$1s$ transition allows a determination of the nuclear charge radius, a fundamental parameter for the validation of nuclear models. The QUARTET collaboration aims to improve the precision of nuclear charge radii for light nuclei from lithium to neon by more than an order of magnitude.

In this talk, I will present the development of MMC-based detectors for high-resolution X-ray spectroscopy of light muonic atoms within QUARTET. I will review the first two measurements at the πE1 beamline at PSI: a proof-of-principle run in 2023 and a dedicated data run in 2024 with lithium, beryllium, and boron targets. A preliminary analysis of the data indicates that the accuracy of the nuclear charge radii of these elements can be improved and demonstrates the feasibility of QUARTET for achieving significantly higher precision in light nuclei. Finally, I will outline the recent 2025 data run and discuss the future prospects of QUARTET.