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New physics bounds from the spectroscopy of muonic atoms

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Experimental setups involving laser spectroscopy of muonic systems have undergone a revolution during the past two decades, providing data with unprecedented precision. The combined use of effective field theories, precision computations, and highly accurate experimental data allows for the spectroscopy of muonic atoms to be a competent and reliable testing ground for new physics in the keV-GeV range as well as for precision measurements within the Standard Model. We will present the EFT framework to carry out such study at next-to-leading order and analyze the applications in two main classes of systems: purely leptonic, such as muonium, and semileptonic systems, where the newly attained proton radius has pushed the theoretical precision of hydrogen and muonic hydrogen spectroscopy.

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