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Kaonic Atom X-ray spectroscopy: the kaon mass puzzle

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Kaonic atoms X-ray spectroscopy is a unique tool to provide experimental data with consequences going from particle and nuclear physics to astrophysics.

30 years ago kaonic atoms were used to measure the charged kaon mass with unprecedented precision. However, there is still a discrepancy of 60 keV between the two most precise measurements, leading to an error of 16 keV on the charged kaon mass with severe consequences for particle physics and all those processes in which kaons are involved, such as the charmonium spectrum.

Combining the excellent quality of the low-energy kaon beam delivered by the DAΦNE collider in Frascati (Italy) with new experimental techniques, as fast and very precise X-ray detectors, we have performed unprecedented measurements of medium and heavy mass kaonic atoms, in the framework of the SIDDHARTA Collaboration, with implication on the charged kaon mass.

I shall introduce the kaon mass puzzle, the first measurement of the kaonic neon, the ongoing measurement of the kaonic lead and their impact on the kaon mass. Finally, I shall discuss future measurements that can lead to the solution of the kaon mass puzzle.

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