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Laser spectroscopy of antiprotonic helium atoms embedded in superfluid helium

Wednesday, July 12, 2023 11:25 AM (25 minutes)

The ASACUSA collaboration at CERN's Antiproton Decelerator has carried out laser spectroscopy of metastable antiprotonic helium atoms embedded in superfluid helium targets [1]. These are three-body Coulomb systems composed of a helium nucleus, an electron and an orbital antiproton. An abrupt and unexpected reduction in the linewidth of the antiprotonic laser resonance to sub-GHz width was observed when the liquid surrounding the atom transitioned into the superfluid phase. In this way, the hyperfine structure arising from the spin-spin interaction between the electron and antiproton was resolved with a relative spectral resolution of 2×10^{-6} . This implies that other helium atoms containing antinuclei, and mesonic atoms formed in superfluid helium, may in the future be studied by laser spectroscopy with a high spectral resolution.

[1] A. Sôtér, H. Aghai-Khozani, D. Barna, A. Dax, L. Venturelli, M. Hori, *Nature* 603, 411 (2022).

Is this abstract from experiment?

Yes

Name of experiment and experimental site

ASACUSA, CERN Antiproton Decelerator

Is the speaker for that presentation defined?

Yes

Details

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Internet talk

Yes

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