ÉCOLE DE PHYSIQUE DES HOUCHES

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Progress towards precision spectroscopy of antihydrogen in the ALPHA experiment

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Antihydrogen offers a unique way to test matter/antimatter symmetry. Antihydrogen can reproducibly be synthesised and trapped in the laboratory for extended periods of time [1][2], offering an opportunity to study the properties of antimatter with high precision. The ALPHA collaboration at CERN has developed an experiment capable of accumulating several tens of trapped antihydrogen atoms [3], and interrogating the bound state energy structure using resonant microwaves [4] and laser light [5]. These recent results demonstrate that spectroscopic measurements of trapped antihydrogen are possible, and the collaboration is firmly en-route towards high precision measurements. Here, I present an overview of the ALPHA apparatus and the techniques which have been developed for measuring the spectrum of antihydrogen.

[1] G. B. Andresen et al. (ALPHA-Collaboration), Nature 468, 673 (2010).
[2] G. B. Andresen et al. (ALPHA-Collaboration), Nature Physics 7, 558 (2011).
[3] M. Ahmadi et al. (ALPHA-Collaboration), Nature Communications 8, 681 (2017).
[4] M. Ahmadi et al. (ALPHA-Collaboration), Nature 548, 66 (2017).
[5] M. Ahmadi et al. (ALPHA-Collaboration), Nature 541, 506 (2017).

Summary

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