Antihydrogen by Positronium-Antiproton Interaction

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A method for producing antihydrogen, $\bar{H}$, by positronium-antiproton collisions in an antiproton ion-trap (see Fig.1) has been published by us earlier in Ref.1. The reaction

$$\bar{p} + Ps \rightarrow \bar{H} + e^-$$

involves the transfer of the positron, e^+, from positronium. This reaction has a large cross section [2-4] such that useful fluxes of $\bar{H}$ can be achieved. Included in the above article are the calculated capture cross sections, short descriptions of the slow positron beam, positronium-formation, and the antiproton ion-trap to be used for antihydrogen production. With presently available technology, collimated monoenergetic $\bar{H}$ beams with an energy of a few KeV and intensity of the order of one per second can be produced by this method. Possible enhancements of this rate are also discussed.

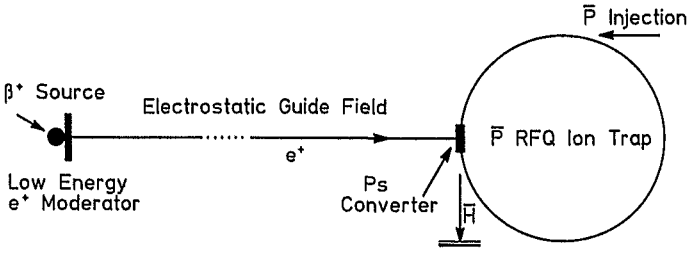

Fig.1. Schematic arrangement for production of antihydrogen. The β^+ particles from a radioactive source (^{22}Na) are moderated; the slow e^+ are electrostatically focused onto the Ps converter at the walls of a $\bar{p}$ ion trap (here shown as an RFQ race-track design), from which a collimated $\bar{H}$ beam emerges.

References

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The Hydrogen Atom Editors: G.F. Bassani · M. Inguscio · T.W. Hänsch