

Positron scattering by atoms

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Abstract. We describe the present status of coupled-state calculations for positron scattering by 'one-electron' atoms. We show how pseudostates are used to represent the continuum channels. Illustrative results from positron scattering by atomic hydrogen and the alkali metals are presented.

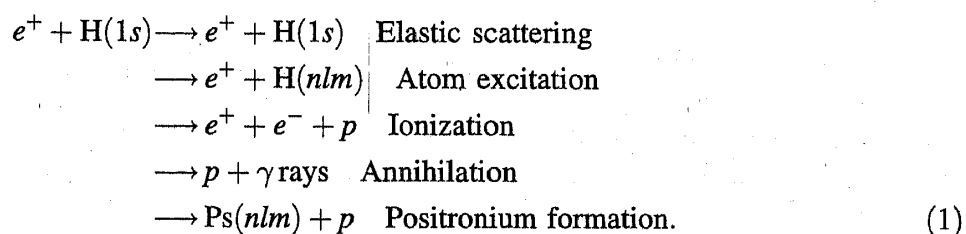
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1. Introduction

The past few years have seen considerable advances in the experimental and theoretical study of positron-atom collisions. On the theoretical side these advances have been associated primarily with the development of coupled-state methods for positron collisions with one-electron atoms, i.e., with atomic hydrogen and, in a frozen core approximation, the alkali metals. For these systems there now exist computer programs capable of using large numbers of eigenstates and pseudostates. Here, we shall confine our attention to the achievements of this coupled-state approach. This method has been pioneered by Ghosh and collaborators at the Indian Association for the Cultivation of Science in Calcutta. For a previous, but recent review containing substantially more references, see [1].

In what way does positron-atom scattering differ from electron-atom scattering? Consider positron scattering by ground state atomic hydrogen. The following processes are possible:



The first three reactions are in common with electron scattering but the last two are particular to the positron. Of these two reactions, positronium formation is the most