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Modified Effective Range Analysis for Positron Scattering on Molecular Hydrogen

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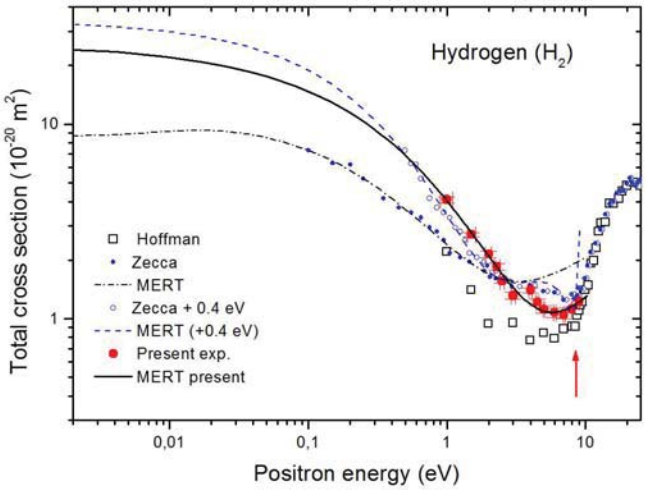
Positron scattering on molecular hydrogen is of basic importance both for Quantum Mechanics and for Astrophysics. Recent calculations by Mitroy and collaborators [1] performed with confined variational method gave the scattering length of -2,7a_0 which is in disagreement with recent experimental data by Zecca et al. [2].

The analytical version of Modified Effective Range Theory [3] proved to be quite successful in analyzing low-energy positron total cross sections, say, in argon, nitrogen and benzene [4]. Presently, we reanalyze the data of ref. [2] in hydrogen and deduce that they are not compatible with MERT, diverging already at 1 eV, see fig. 1, or giving unphysical parameters of scattering. This is so even if we tried some renormalization of the energy scale that managed to reconcile the data by Zecca and collaborators with other results in H_2O and HCOOH [5].

In turn, earlier experiments, from Detroit [6] and Trento [7] give reasonable parameters of scattering (scattering length -2.51a_0 and -3.13a_0, respectively). In particular, as seen in fig. 1, Trento data [7] can be approximated well using the scattering length by Mitroy and collaborators [1]. Detailed MERT analysis for other set of data [8] will be also presented.



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