

Antihydrogen-hydrogen annihilation at subkelvin temperatures

A. Voronin¹ and J. Carbonell²

¹ *P.N. Lebedev Physical Institute, 53 Leninsky pr., 117924 Moscow, Russia*

² *Institut des Sciences Nucleaires, 53 Av. des Martyrs, F-38026, Grenoble France*

The main properties of the interaction of ultra cold ($T \leq 10^{-3}$ K) antihydrogen with atomic hydrogen are established in the framework of the coupled-channels model. They include the scattering length, elastic and inelastic cross sections and Protonium formation spectrum. The annihilation cross-section behavior differs from the predictions obtained within semiclassical models extrapolated to low energies. It is shown that observable behavior is determined by a family of $\bar{H}H$ nearthreshold metastable states. Strong isotope effect in low energy scattering of $\bar{H}H$ and $\bar{H}D$ is predicted. The effects of collisional shift and broadening of 2S1S transition line of \bar{H} is estimated.