Determining pion scattering lengths and the lifetime of the pionium atom with the DIRAC experiment

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The DIRAC collaboration is measuring the lifetime of the $\pi^+\pi^-$ bound state, the *pionic atom*. This lifetime is related to the $I = 0$ and 2 scattering lengths as $\tau \propto 1/|a_o - a_2|^2$. Thus by measuring $A_{2\pi}$ lifetime we will be able to find the scattering lengths difference. The experimental determination of the latter would provide a test for the Chiral Perturbation theory, which has determined this value with very high precision. I will discuss the latest results obtained by our collaboration.

[1] The DIRAC collaboration, *Detection of $\pi^+\pi^-$ Atoms with the DIRAC Spectrometer at CERN*, submitted to Physics Letters B.

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