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Four -body calculation of the 2p level shift in antikaonic helium $\bar{K}3$He atom SHALVA TSIKLAURI, JOSHUA TENON, The City University of New York-Borough of Manhattan Community College — The strong interaction of charged antikaons (K -) with nucleons and nuclei in the low-energy is a intriguing subject matter. The antikaon plays an unusual role in nuclear physics due to the strong attraction antikaon-nucleon which is a key question for possible kaonic nuclear bound states. Low-lying energy levels of kaonic atoms are shifted from their pure electromagnetic values and widened due to the strong interaction between the antikaon and nucleon. The level shift and width of the kaonic atoms can be determined by x-ray spectroscopy.The X-ray measurements of $\bar{K}$He atoms introduced inconsistency between theory and experiment both in the shift and width of the $\bar{K}$He $2p$state. The average of the shift was large $\sim$40 eV, while a majority of theoretical calculations suggested very small shift below 1 eV . This significant disagreement between the experimental results and the theoretical calculations is known as the "kaonic helium puzzle." We suggest a new theoretical analysis of the four-body antikaonic ^{3}He in the framework of the method of hyperspherical harmonics (HH) for solving four body Schrodinger equations. This is the first time when the HH microscopic method is applied to study kaonic helium.

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