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Search for a Low-mass Higgs boson in the radiative decay $\Upsilon(1S) \to \gamma A^0$, $A^0 \to \tau^+\tau^-$ at BABAR ALEXANDER GEORGES, Lawrence Berkeley National Laboratory and University of California, Berkeley, BABAR COLLABORATION — The Higgs boson is a scalar elementary particle predicted by the Higgs mechanism, which explains the origin of mass of fundamental particles. The discovery of the Higgs boson would would be key to unlocking the mystery of mass. The Next-to-Minimal Supersymmetric Standard Model (NMSSM) predicts the existence of a light scalar CP-odd Higgs boson in the mass range of 0-10 GeV. The primary objective of the present analysis is to search for a light Higgs boson A^0 produced via $b\bar{b}$ annihilation in the decay of $\Upsilon(1S)$. We search for the decay $\Upsilon(2S) \to \pi^+\pi^-\Upsilon(1S), \Upsilon(1S) \to \gamma A^0,\ A^0 \to \tau^+\tau^-$ in the BABAR dataset by combining variables that describe the decays of interest into two multi-variate discriminants, which help separate signal events from unwanted backgrounds.

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