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Title:	Search for a Light Higgs Boson in Single-Photon Decays of $\Upsilon(1S)$ Using $\Upsilon(2S) \rightarrow \pi^+ \pi^- \Upsilon(1S)$ Tagging Method
Authors:	Bhardwaj, Vishal (/jspui/browse?type=author&value=Bhardwaj%2C+Vishal) Patra, Sourav (/jspui/browse?type=author&value=Patra%2C+Sourav)
Keywords:	Light Higgs Single-Photon Decays of $\Upsilon(1S)$ Tagging Method
Issue Date:	2022
Publisher:	American Physical Society
Citation:	Physical Review Letters, 128(8), 81804.
Abstract:	We search for a light Higgs boson (A_0) decaying into a $\tau^+ \tau^-$ or $\mu^+ \mu^-$ pair in the radiative decays of $\Upsilon(1S)$. The production of $\Upsilon(1S)$ mesons is tagged by $\Upsilon(2S) \rightarrow \pi^+ \pi^- \Upsilon(1S)$ transitions, using $158 \times 10^6 \Upsilon(2S)$ events accumulated with the Belle detector at the KEKB asymmetric energy electron-positron collider. No significant A_0 signals in the mass range from the $\tau^+ \tau^-$ or $\mu^+ \mu^-$ threshold to $9.2 \text{ GeV}/c^2$ are observed. We set the upper limits at 90% credibility level (C.L.) on the product branching fractions for $\Upsilon(1S) \rightarrow \gamma A_0$ and $A_0 \rightarrow \tau^+ \tau^-$ varying from 3.8×10^{-6} to 1.5×10^{-4} . Our results represent an approximately twofold improvement on the current world best upper limits for the $\Upsilon(1S) \rightarrow \gamma A_0 (\rightarrow \tau^+ \tau^-)$ production. For $A_0 \rightarrow \mu^+ \mu^-$, the upper limits on the product branching fractions for $\Upsilon(1S) \rightarrow \gamma A_0$ and $A_0 \rightarrow \mu^+ \mu^-$ are at the same level as the world average limits, and vary from 3.1×10^{-7} to 1.6×10^{-5} . The upper limits at 90% credibility level on the Yukawa coupling $f_Y(1S)$ and mixing angle $\sin \theta_{A_0}$ are also given.
Description:	Only IISER Mohali authors are available in the record.
URI:	https://doi.org/10.1103/PhysRevLett.128.081804 (https://doi.org/10.1103/PhysRevLett.128.081804) http://hdl.handle.net/123456789/4920 (http://hdl.handle.net/123456789/4920)
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