Contribution ID: **169** Type: **Contributed**

Sensitivity of the η(′) → π0γγ and η′ → ηγγ decays to a sub-GeV leptophobic U(1)B boson

Wednesday, June 7, 2023 3:00 PM (20 minutes)

The sensitivity of the rare decays $\eta^{(\prime)} \to \pi^0\gamma\gamma$ and $\eta' \to \eta\gamma\gamma$ to signatures of a leptophobic B boson in the MeV-GeV mass range is analyzed in this work.
By adding an explicit B-boson resonance exchange, $\eta \to B\gamma \to \pi^0\gamma\gamma$, to the Standard Model contributions from vector and scalar meson exchanges,and employing experimental data for the associated branching ratios,it allows us to improve the current constraints on the B-boson mass m_B and coupling to Standard Model particles α_B.
From these constraints and the analysis of the available experimental $\gamma\gamma$ invariant mass distribution, we show that a B-boson signature in the resonant mass range $m_{\pi^0} \leq m_B \leq m_\eta$ is strongly suppressed and would be very difficult to experimentally identify, assuming that the leptophobic B boson only decays to Standard Model particles.
In contrast, the limits outside this mass window are less stringent and the corresponding t- and u-channel signatures may still be observable in the data, as it occurs with the nonresonant Standard Model ρ, ω and ϕ meson exchanges.
In addition, we make use of experimental data from the $\eta' \to \pi^0\gamma\gamma$ and $\eta' \to \eta\gamma\gamma$ decays to explore larger B-boson masses.
Our results are relevant for the B-boson search programs at existing and forthcoming light-meson facilities, such as KLOE(-II) and Jefferson Lab Eta Factory experiments.

Primary author: ESCRIBANO, Rafel (Universitat Autònoma de Barcelona)

Co-authors: ROYO, Emilio (Universitat Autònoma de Barcelona); GONZALEZ-SOLIS, Sergi (Los Alamos National Lab)

Presenter: GONZALEZ-SOLIS, Sergi (Los Alamos National Lab)

Session Classification: Hadrons and physics beyond the standard model

Track Classification: Hadrons and physics beyond the standard model