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Search for $B^+ \to \ell^+ \nu_\ell \gamma$ decays with hadronic tagging using the full Belle data sample

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The semileptonic decay $B^+ \to \ell^+ \nu_\ell \gamma$ with $\ell^+ = e^+, \mu^+$ allows for the measurement of λ_B, which is the first moment of the B meson distribution amplitude. This parameter is needed for the calculation of charmless hadronic B decays in the QCD factorization scheme. The analysis is carried out with the full Belle data sample of $772 \times 10^6 B\bar{B}$ pairs. One of the B mesons is reconstructed in a hadronic decay channel and its momentum is used to compute the squared missing mass in the decay of the second signal-side B meson. After an efficient signal selection a neural network is trained to separate signal and the main background $B^+ \to \ell^+ \nu_\ell \pi^0$. The signal is extracted in a fit to the squared missing mass in bins of the network output and a limit on the branching fraction is obtained which is the strongest to date.

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