# Literature Review

# An upper bound on the decay $au o \mu \gamma$ from Belle

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#### 1 Introduction

- 1. General introduction
- 2. Brief overview of SM
- 3. Motivation for search

## 2 Leptoflavour Changing Processes

- 1. Look up papers/talk to John bc he knows leptoquarks???
- 2. Feynman diagram; SM vs. BSM

#### 3 Other Searches

- 1. Belle rules
- 2. BaBar
- 3. LHCb?
- 4. Belle 2 future searches

#### 4 References

- 1. Belle papers
- 2. Charged-Lepton Flavour Physics (CERN): 1201.5093v2
- 3. Explaining the CMS Higgs flavor violating decay excess: 1409.7890v2
- 4. Flavor Violating Higgs Decays: 1209.1397v2
- 5. New Search for  $\tau \to \mu \gamma$  etc. (Belle): 0705.0650v2
- 6. An Upper Bound on the Decay  $\tau \to \mu \gamma$  from Belle: arXiv:hep-ex/0310029v3

#### References

- [1] Kazuo Abe et al. A New Search for tau -; mu gamma and tau -; e gamma Decays at Belle. In Proceedings of the 33rd International Conference on High Energy Physics (ICHEP '06), 2006.
- [2] D. Aristizabal Sierra and A. Vicente. Explaining the CMS Higgs flavor violating decay excess. *Phys. Rev.*, D90(11):115004, 2014.
- [3] Bernard Aubert et al. Searches for Lepton Flavor Violation in the Decays tau+- —; e+- gamma and tau+- —; mu+- gamma. Phys. Rev. Lett., 104:021802, 2010.
- [4] Roni Harnik, Joachim Kopp, and Jure Zupan. Flavor Violating Higgs Decays. *JHEP*, 03:026, 2013.
- [5] K. Hayasaka et al. Search for tau —; e gamma decay at BELLE. Phys. Lett., B613:20–28, 2005.
- [6] K. Hayasaka et al. New search for tau  $\rightarrow$  mu gamma and tau  $\rightarrow$  e gamma decays at Belle. *Phys. Lett.*, B666:16–22, 2008.
- [7] K. Hayasaka et al. Search for Lepton Flavor Violating Tau Decays into Three Leptons with 719 Million Produced Tau+Tau- Pairs. *Phys. Lett.*, B687:139–143, 2010.
- [8] Andreas Hoecker. Charged-Lepton Flavour Physics. Pramana, 79:1141–1167, 2012.
- [9] Koji Ishiwata, Zoltan Ligeti, and Mark B. Wise. New Vector-Like Fermions and Flavor Physics. JHEP, 10:027, 2015.
- [10] Vardan Khachatryan et al. Observation of the rare  $B_s^0 \to \mu^+\mu^-$  decay from the combined analysis of CMS and LHCb data. *Nature*, 522:68–72, 2015.
- [11] Vardan Khachatryan et al. Search for Lepton-Flavour-Violating Decays of the Higgs Boson. *Phys. Lett.*, B749:337–362, 2015.
- [12] Yoshiyuki Miyazaki. Search for Lepton Flavor Violating  $\tau$  Decays at B-factories. In Flavor physics and CP violation. Proceedings, 9th International Conference, FPCP 2011, Maale HaChamisha, Israel, May 23-27, 2011, 2011.
- [13] T. Ohshima. Study of LFV in tau decay at Belle. Nucl. Phys. Proc. Suppl., 169:174–185, 2007.
  [,174(2007)].