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## Search for muon-philic new light gauge boson at Belle II

Motivated by the long-lasting  $3.5\sigma$  discrepancy in the anomalous magnetic moment of muon, we consider a new muon-specific force mediated by a light gauge boson,  $X$ , with mass  $m_X < 2m_\mu$  and the coupling constant  $g_X$  ( $10^{-4}$ ,  $10^{-3}$ ). We show that the Belle II experiment has a robust chance to probe such a light boson in  $e^+e^- \rightarrow \mu^+\mu^-X$  channel and cover the most interesting parameter space explaining the discrepancy with the planned target luminosity,  $\int dt \mathcal{L} = 50 \text{ ab}^{-1}$ . From the signal of  $\mu^-\mu^+ + E_{miss}$  at Belle II, we expect that the (invisibly decaying) muon-philic light ( $m_X < 2m_\mu$ ) gauge boson can be probed down to  $g_X \geq 1.5 \times 10^{-4}$  ( $4.6 \times 10^{-4}$ ,  $2.3 \times 10^{-4}$ ) for 50 (1, 10)  $\text{ab}^{-1}$  search.

### Mini-abstract

Light muonic force search at Belle II by using “Dimuon+Missing Energy( $\mu^+\mu^+ + E_{miss}$ )”.

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