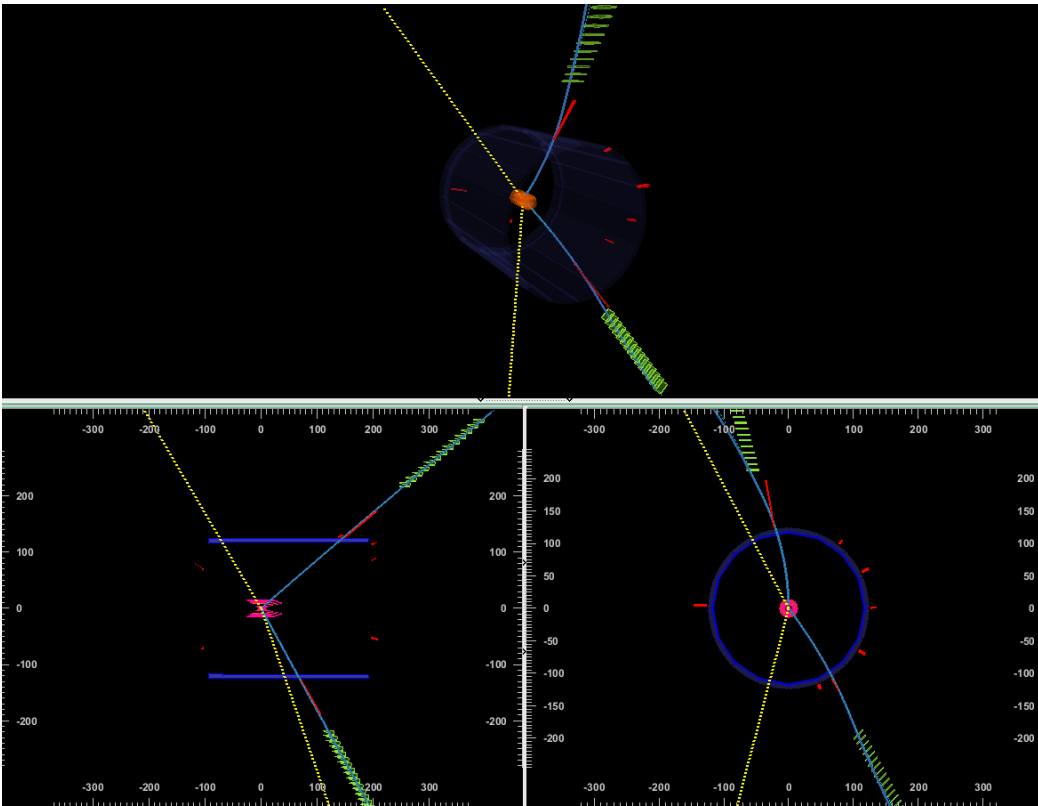


Belle II Public Physics Results

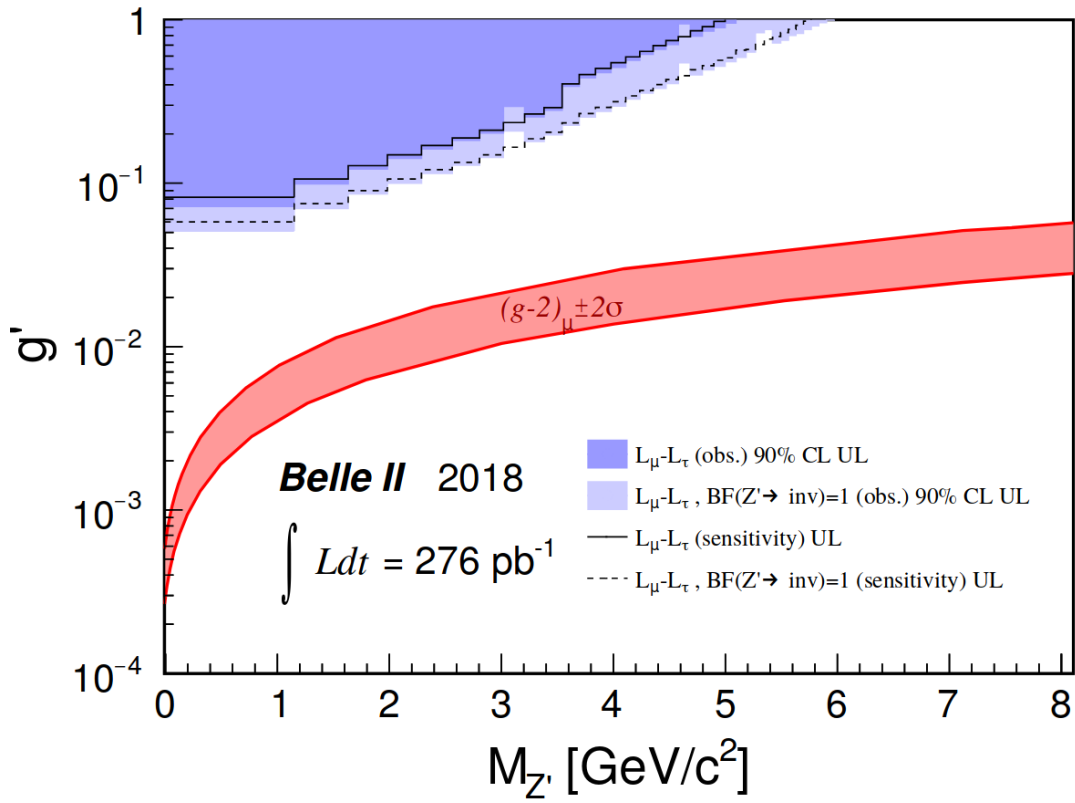
- Search for an invisibly decaying Z boson at Belle II in $e^+e^+(e^\pm)$ plus missing energy final states

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Abstract: Theories beyond the standard model often predict the existence of an additional neutral boson, the Z' . Using data collected by the Belle II experiment during 2018 at the SuperKEKB collider, we perform the first searches for the invisible decay of a Z in the process $e^+e^+ Z'$ and of a lepton-flavor-violating Z in $e^+e^- e^\pm Z'$. We do not find any excess of events and set 90% credibility level upper limits on the cross sections of these processes. We translate the former, in the framework of an L - L theory, into upper limits on the Z coupling constant at the level of $5 \times 10^{-2} \pm 1$ for $M_{Z'} \leq 6 \text{ GeV}/c^2$.



A simulated event in which a Z' boson is produced in association with two muons (blue tracks with green hits) and decays into invisible particles that are not detected and are shown in yellow.



90%CL upper limits on coupling constant g . Dark blue filled areas show the exclusion regions for g at 90% CL, assuming the LL predicted BF for $Z' \rightarrow \text{invisible}$; light blue areas are for $\text{BF}(Z' \rightarrow \text{invisible}) = 1$. The solid and dashed lines are the expected sensitivities in the two hypotheses. The red band shows the region that could explain the muon anomalous magnetic moment $(g-2)_{\mu} \pm 2\sigma$.