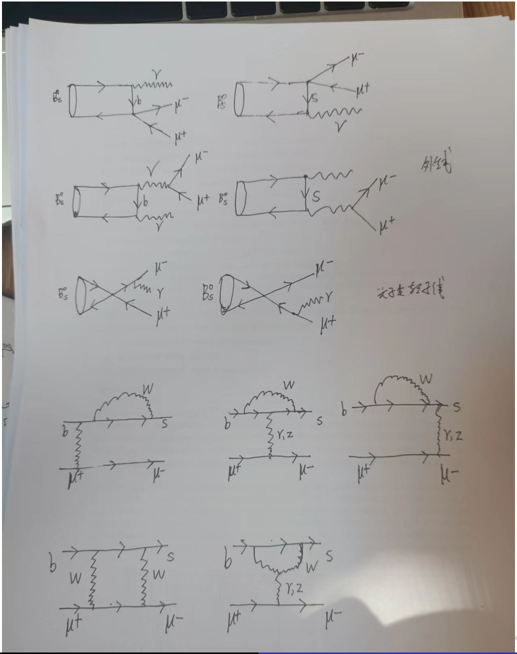
Henan Normal University

October 22, 2022

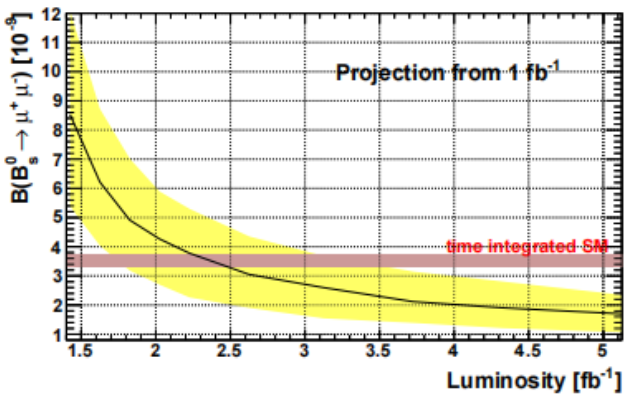

B_s^0
γ
μ^-
μ^+
b
S
W
γ, Z
s

对于$B_s^0 \to \mu^+\mu^-$衰变，在树图级，由于GIM机制，没有味道改变的中性流，因此只能通过圈图即企鹅图来衰变。这些图都是QCD修正的，可通过胶子线连接夸克线得到。

DOI: https://doi.org/10.22323/1.174.0358

Mode	$B_s^0 \to \mu^+\mu^-$		$B^0 \to \mu^+\mu^-$	
Limit	at 90 % C.L.	at 95 % C.L.	at 90 % C.L.	at 95 % C.L.
Exp. bkg+SM	6.3×10^{-9}	7.2×10^{-9}		
Exp. bkg	2.8×10^{-9}	3.4×10^{-9}	0.91×10^{-9}	1.1×10^{-9}
Observed	3.8×10^{-9}	4.5×10^{-9}	0.81×10^{-9}	1.0×10^{-9}

Table 1: Expected and observed limits on $\mathscr{B}(B^0_{(s)} \to \mu^+\mu^-)$.



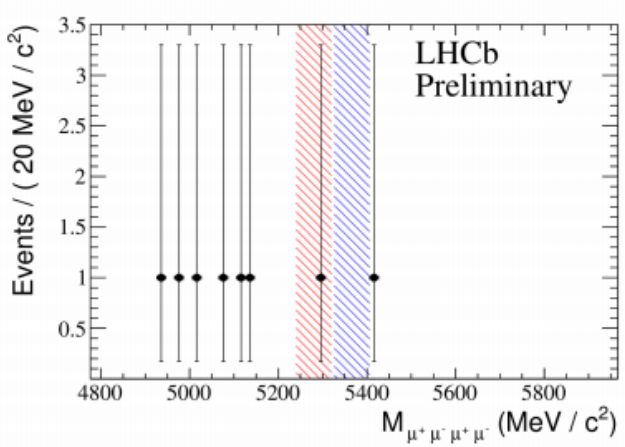


Figure 4: Observed invariant mass distribution of the $B^0_{(s)} \to \mu^+\mu^-\mu^+\mu^-$ candidates. The blue (red) dashed area is the $B^0_s(B^0)$ mass window.

$$\mathcal{B}(B^0_s \to \mu^+\mu^-\mu^+\mu^-) < 1.3 \times 10^{-8}$$

$$\mathcal{B}(B^0 \to \mu^+\mu^-\mu^+\mu^-) < 5.4 \times 10^{-9}$$

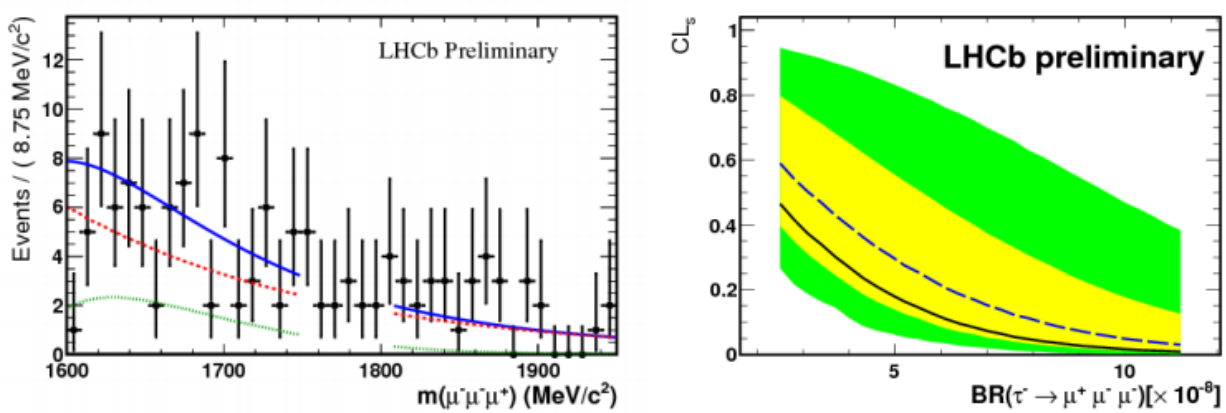


Figure 5: (left) Observed invariant mass distribution of the $\tau^- \to \mu^-\mu^-\mu^+$ candidates in the most signal like merged bins. The solid line is the fit to the data of the sum of the combinatorial exponential contribution (dashed red line) and of the $D_s^- \to \eta(\mu^+\mu^-\gamma)\mu^-\overline{\nu}_\mu$ one (dashed green line). (right) CL_S as a function of the assumed $\mathscr{B}$. The long dashed blue curves are the medians of the expected CL_S distributions for $\tau^- \to \mu^-\mu^-\mu^+$ if background only was observed. The yellow (green) areas cover, for each $\mathscr{B}$, 34% (48%) of the expected CL_S distribution on each side of its median. The solid black curves are the observed CL_S.

$$\mathcal{B}(\tau^- \to \mu^-\mu^-\mu^+) < 7.8(6.3) \times 10^{-8}$$