More tests of flavour anomalies

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  - *Either dataset conveys the same message: LUV*
  - *Effective interactions for $b \to s$ and $b \to c$ decays*
    are related by SU(2) symmetry.

    That's what one expects of new interactions
    above the EW scale

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  ⇨ *Again coherent with the symmetries one expects of NP interactions above the EWSB scale*

- *The above NP pattern can be generated from a purely 3rd-generation interaction of the kind* [Glashow *et al., 2014*]

$$H_{\rm NP} = G\,(\bar{b}'_L \gamma^\lambda b'_L)\,(\bar{\tau}'_L \gamma_\lambda \tau'_L)$$

with $G = 1/\Lambda^2_{\rm NP} \ll G_F$

expected e.g. in partial-compositeness frameworks

with fields in the gauge basis

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- *Such structure is also constrained by direct searches, notably of states decaying to 2 τ* [Greljo, Isidori, Marzocca, 2015][Faroughy, Greljo, Kamenik, 2016]

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- *Maybe data are not yet mature enough?*

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  - ***Extract long-distance effects from <u>data</u>***

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- *Direct measurement (= with photon detection) attempted for some time, but very challenging at hadron colliders:*
  - *No tracking information available for photons*
  - *Plenty of photons from π^0 's*

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Basic Idea [Dettori, DG, Reboud, 2017]

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i.e. without the need to detect the additional photon

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- *Essential precondition: controlling all other backgrounds*

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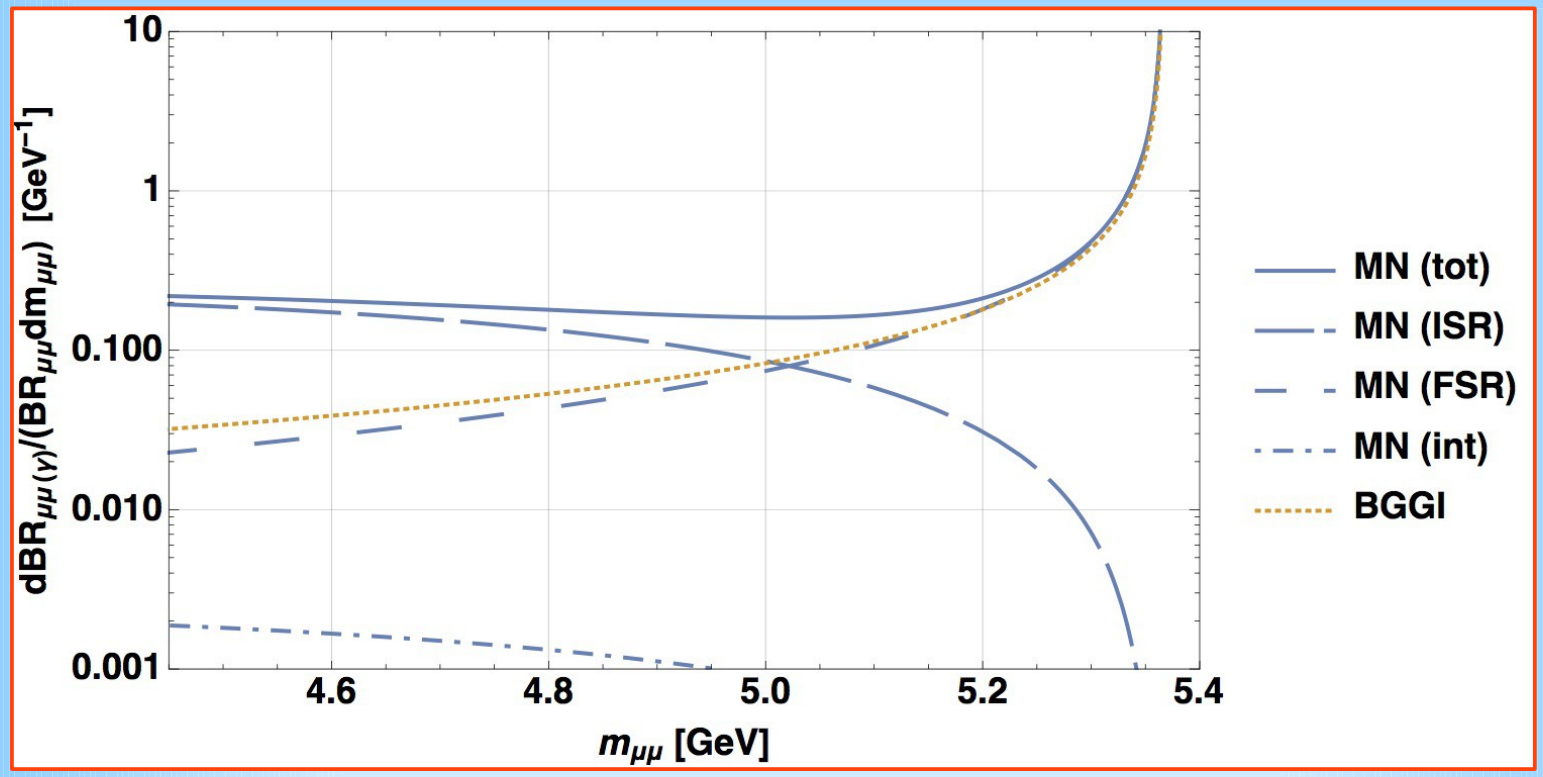
$B_s \to \mu\mu\,\gamma$: ISR vs. FSR

[Dettori, DG, Reboud, 2016]



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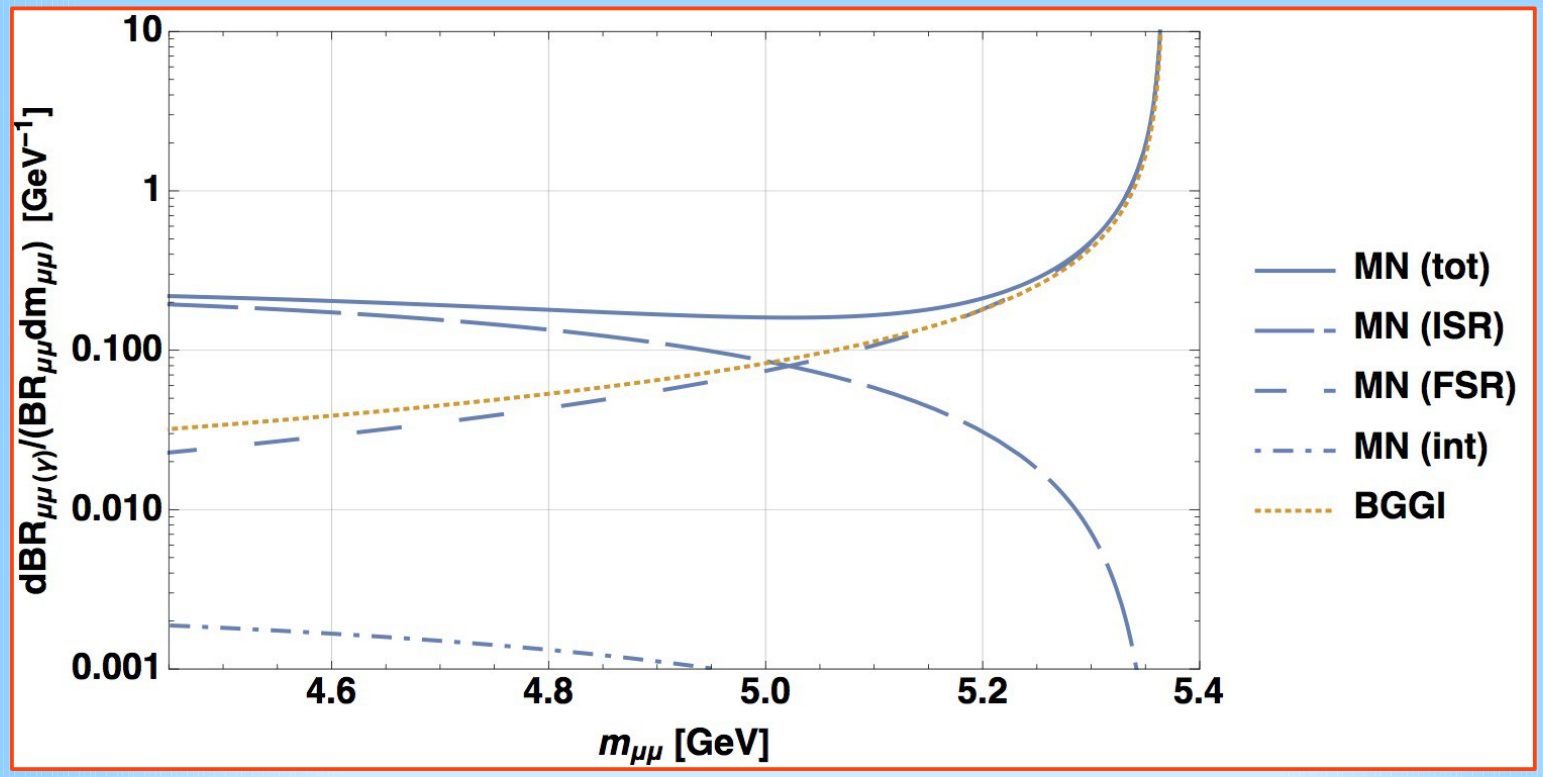

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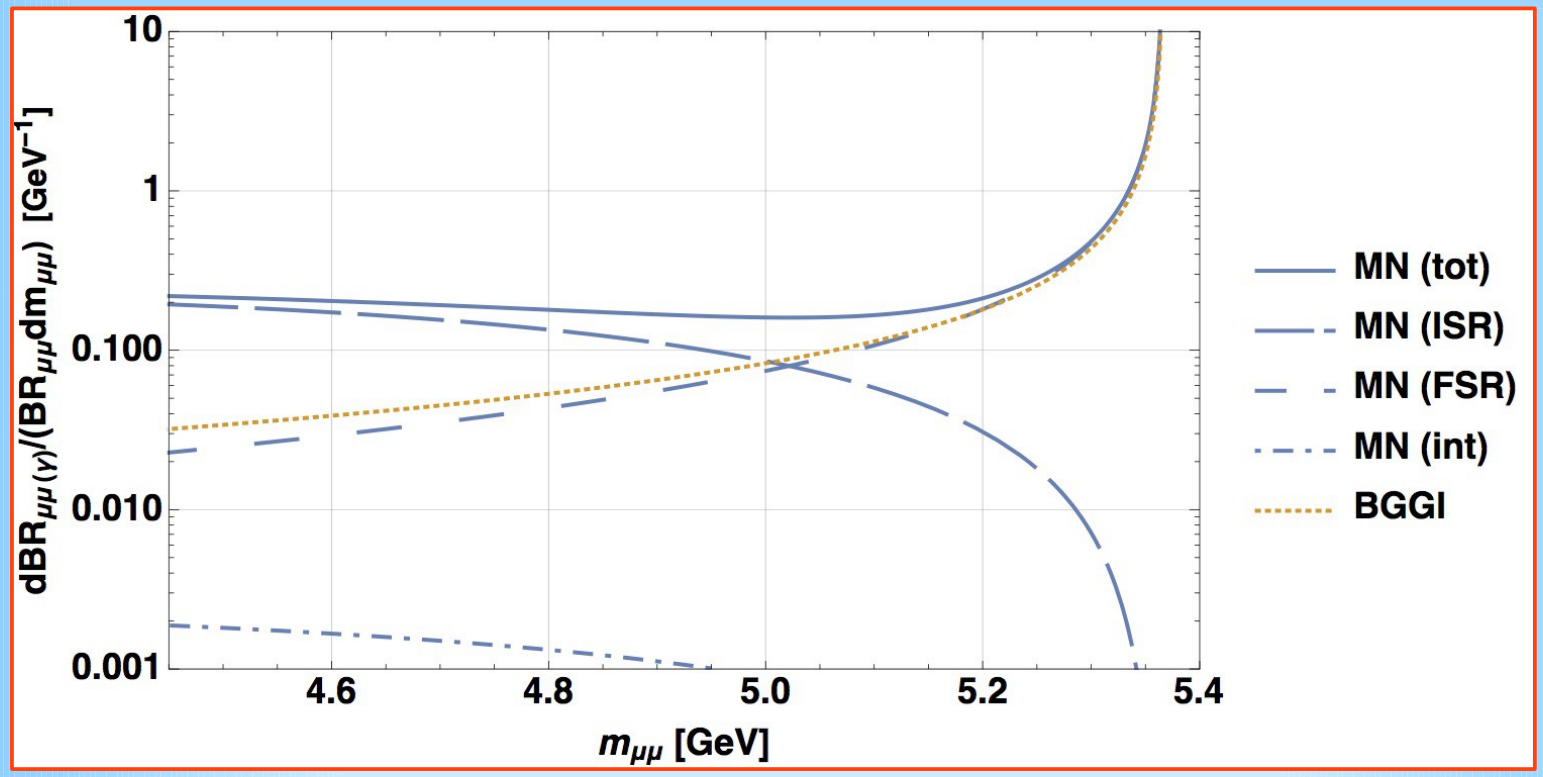

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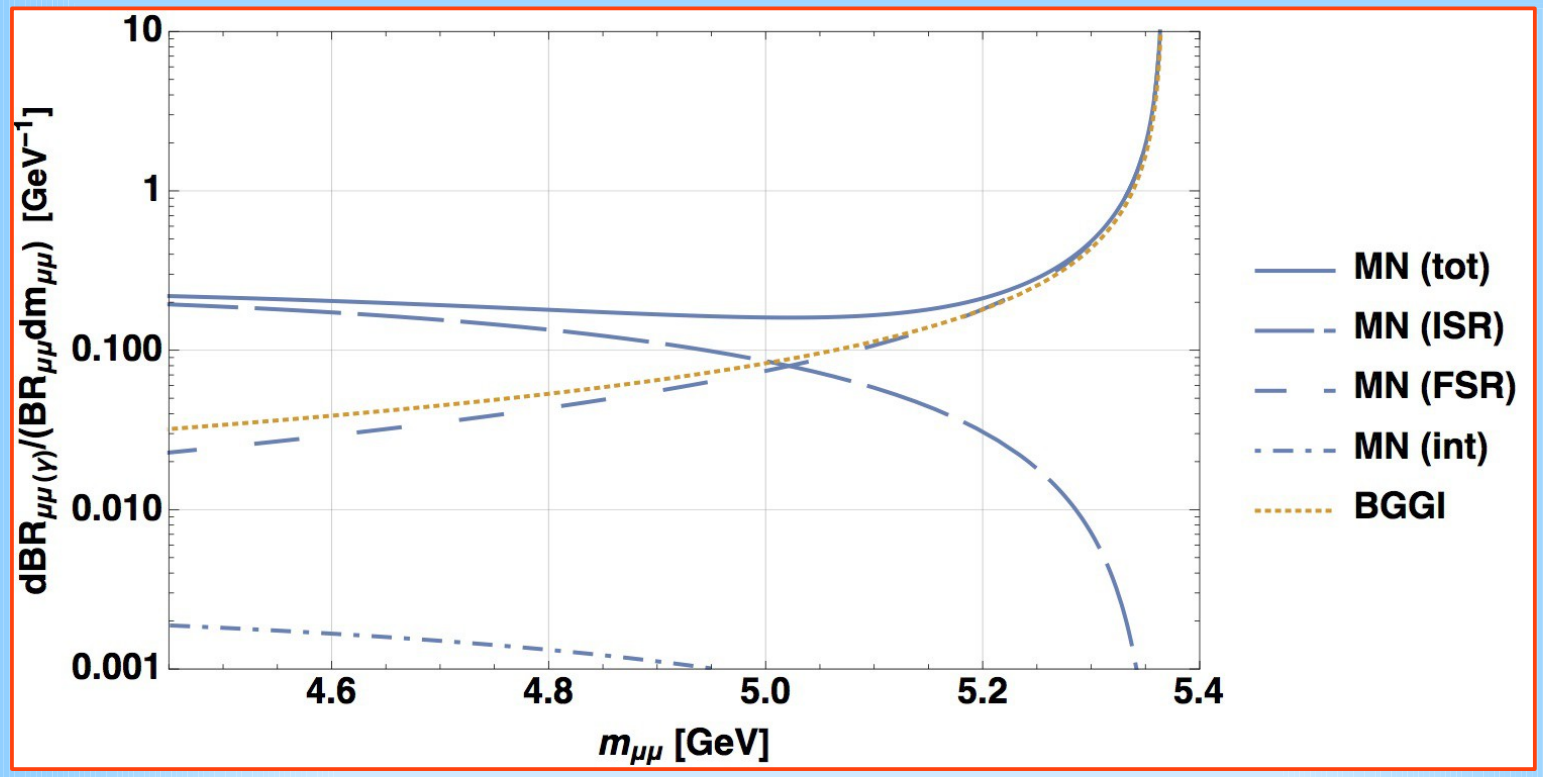

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So this measurement gives access to the ISR spectrum

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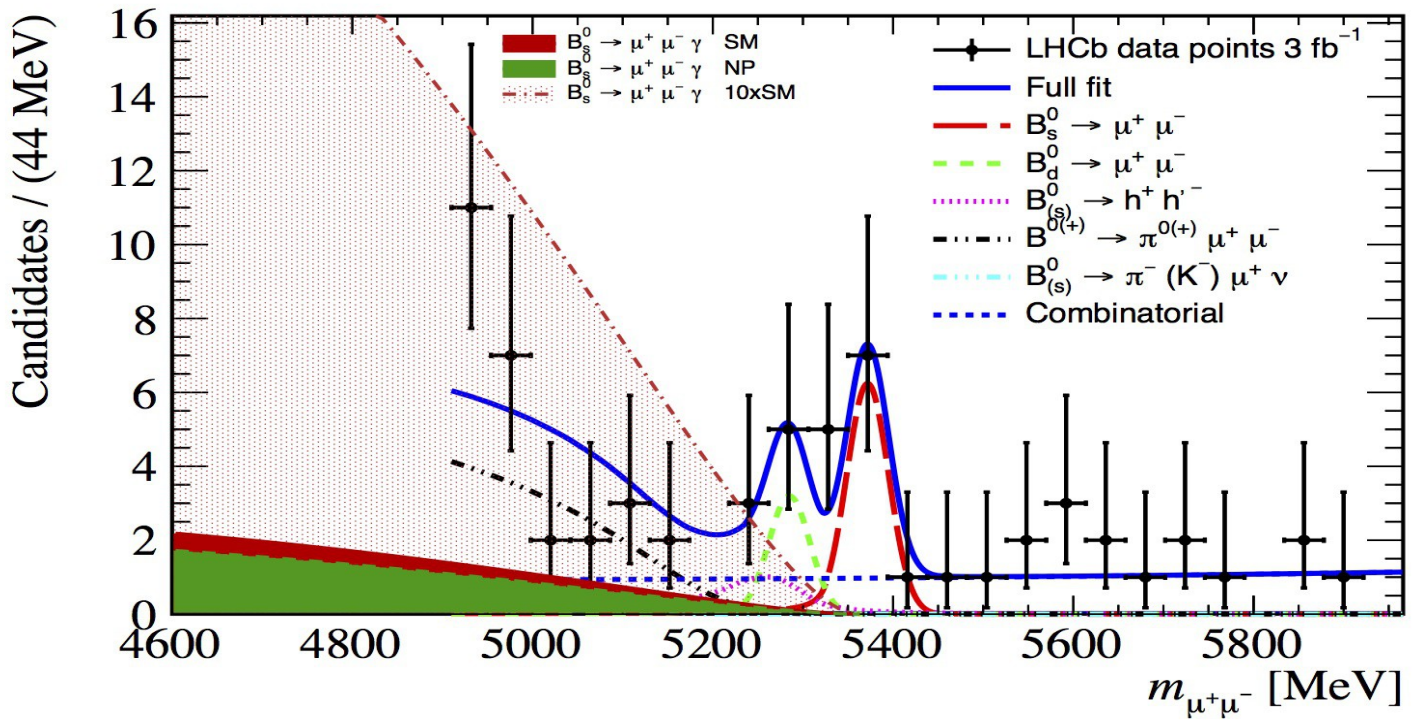

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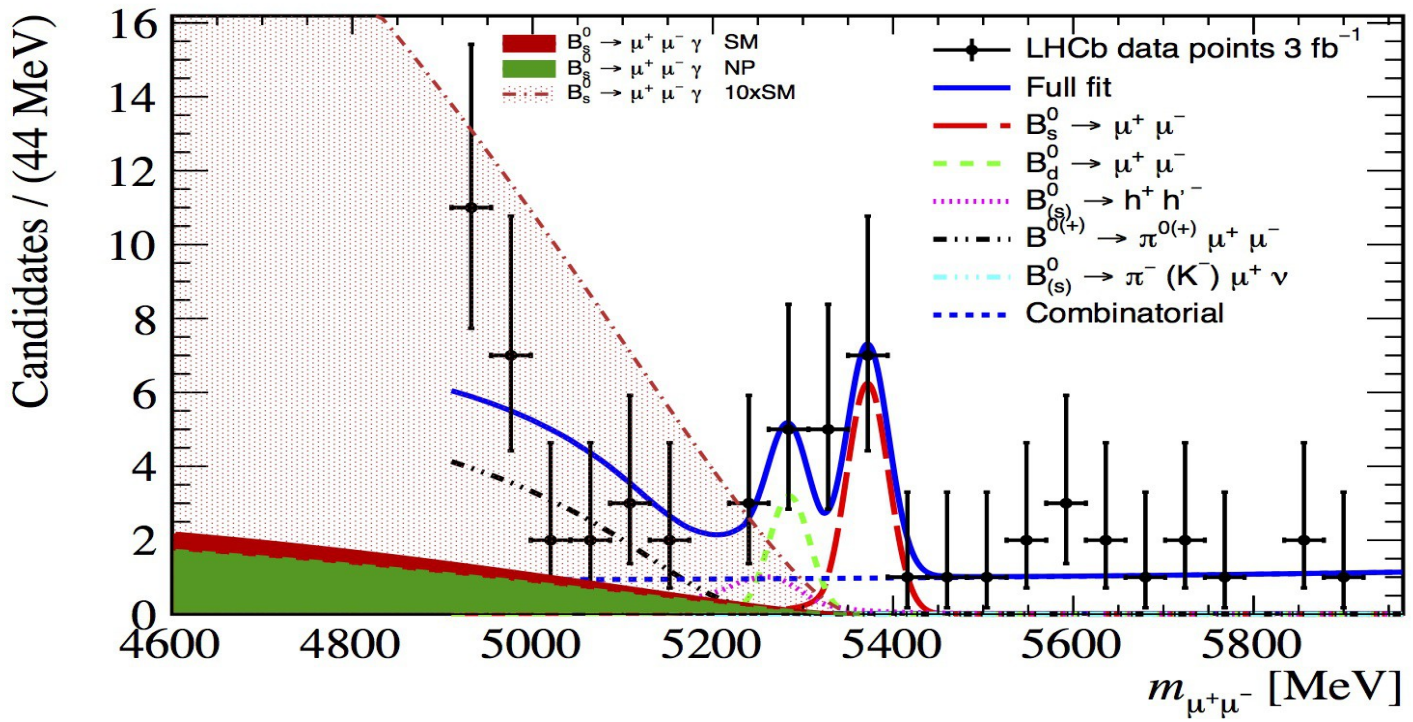

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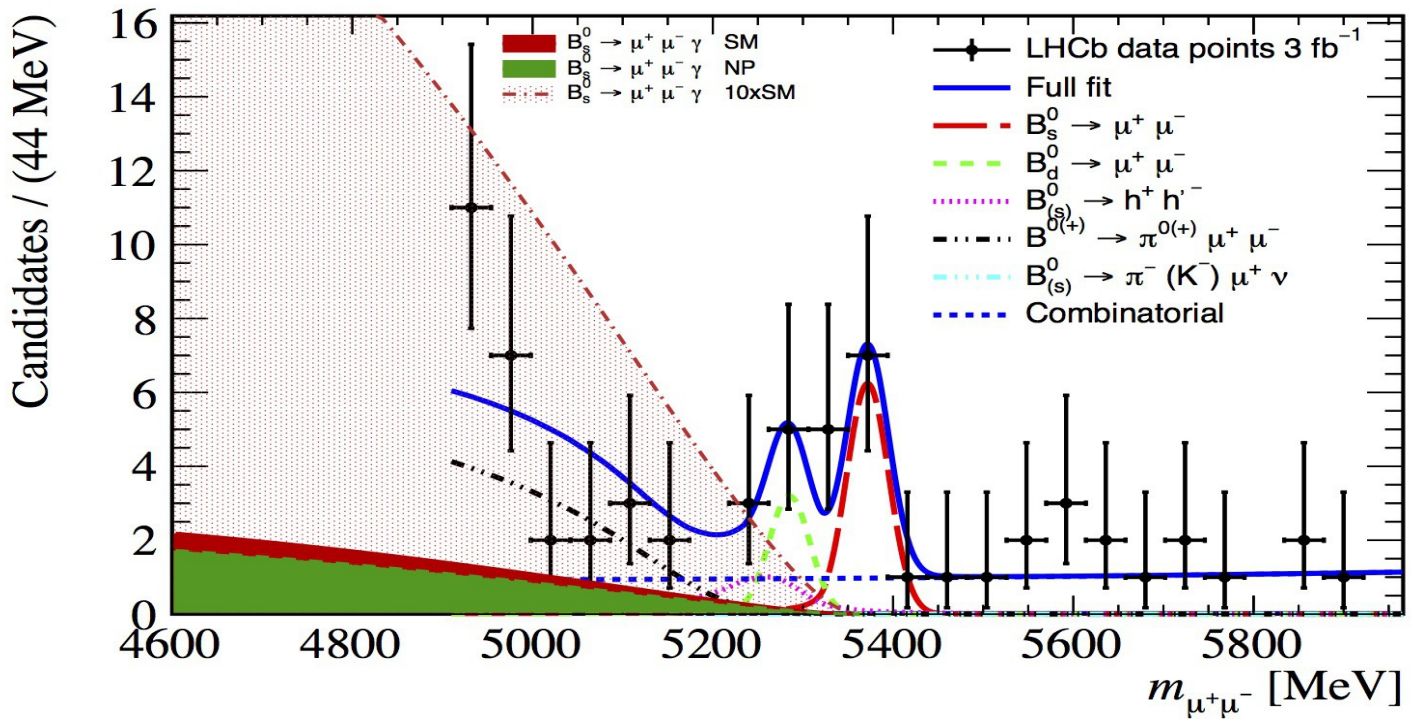

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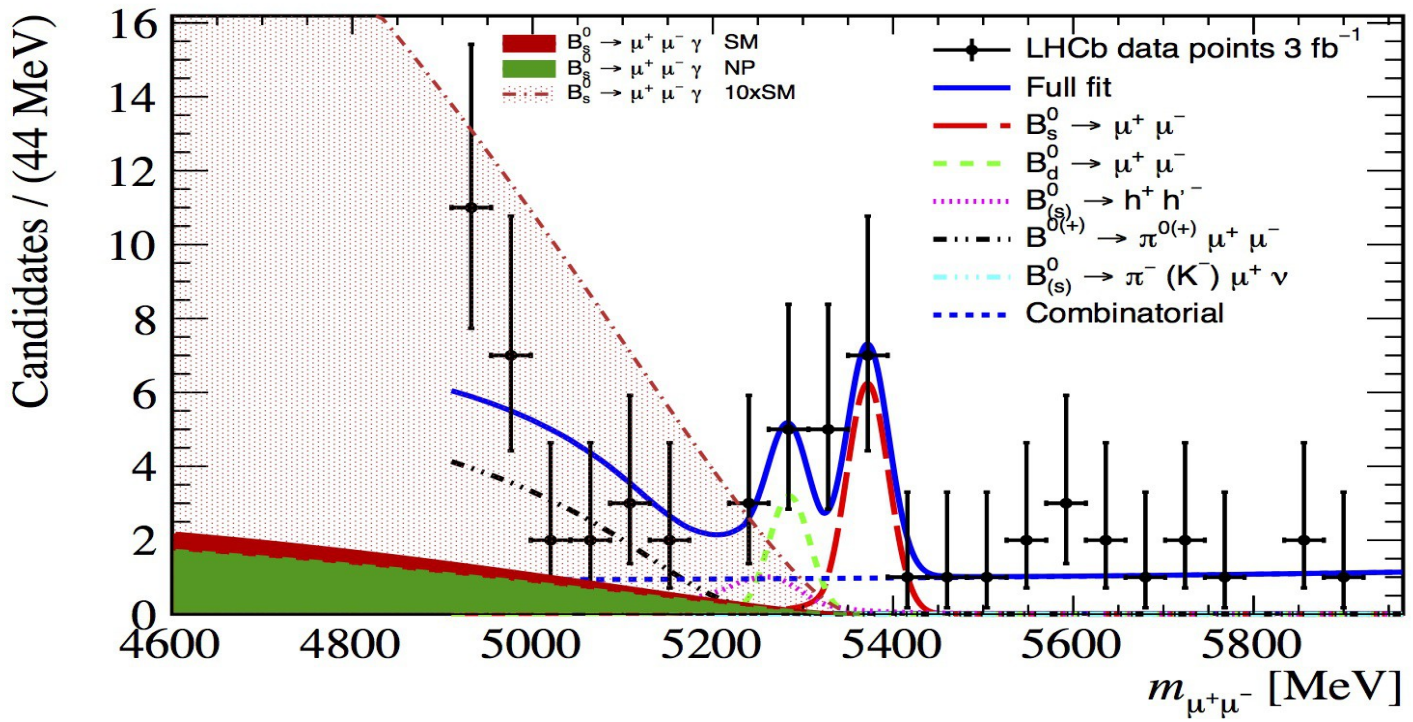

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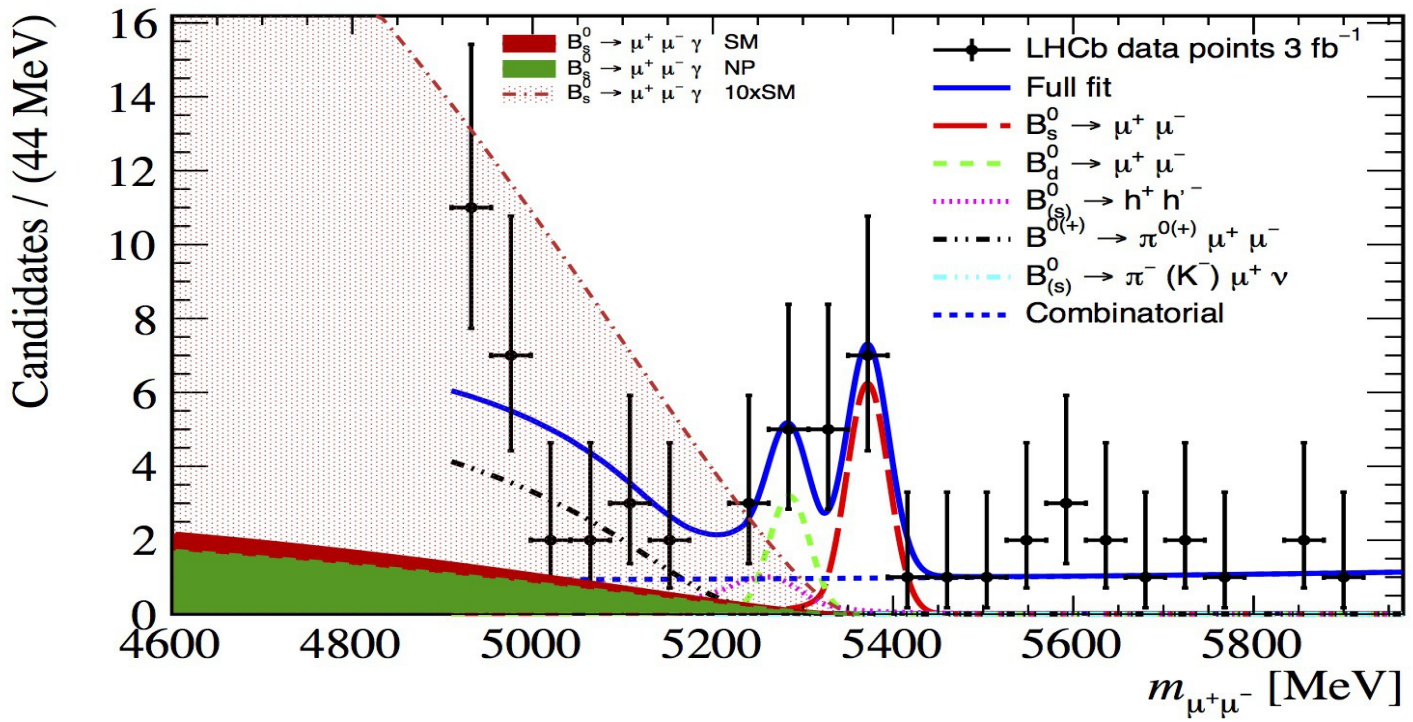

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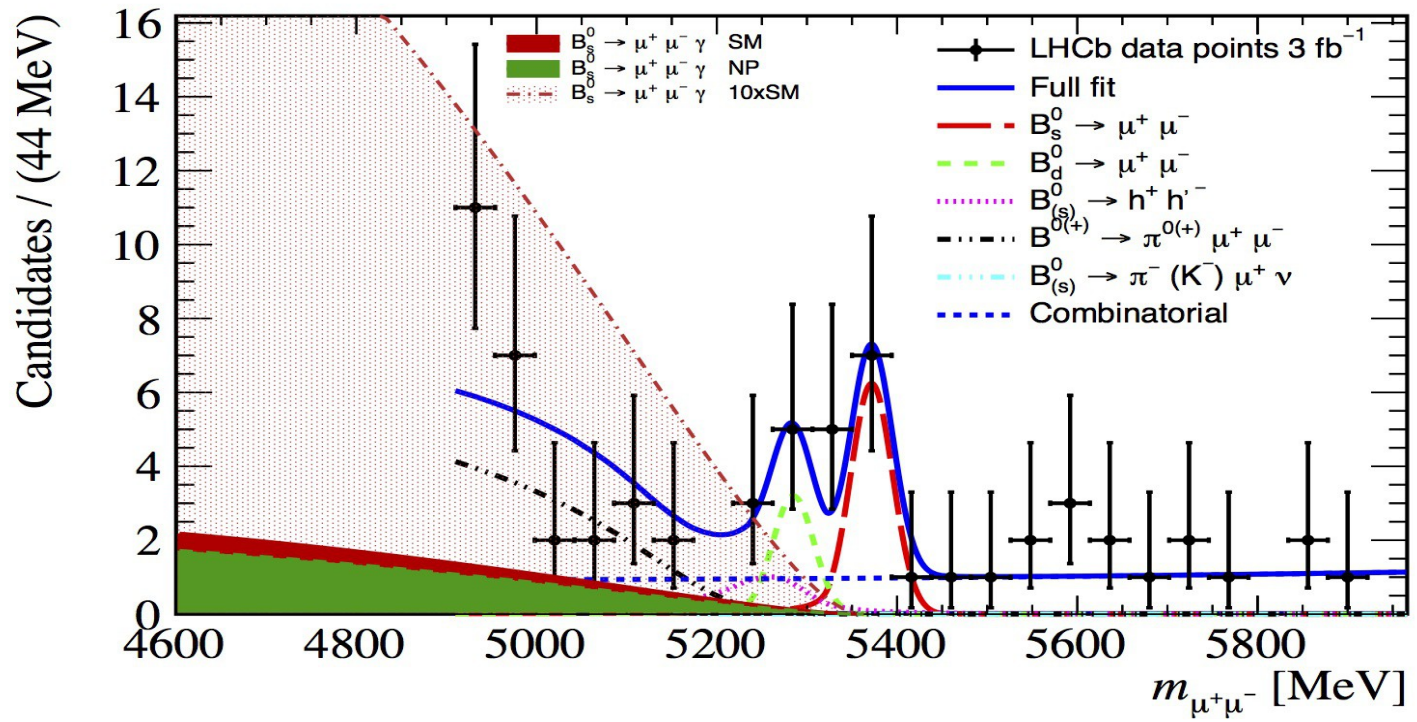

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  - LQCD $B \to \gamma$ matrix elements can be most easily determined

Measurement is work in progress at LHCb.

Note that PDG doesn't even quote a limit on $Bs \to \mu\mu\,\gamma$

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LHCb, 1612.06764

Similar approach as Lyon, Zwicky, '14

Recently, LHCb measured BR($B^+ \to K^+ \mu\mu$) including an accurate parameterisation of the LD component in the $c\bar{c}$ region

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Result: *BR compatible with previous measurements, and (again) smaller than SM*

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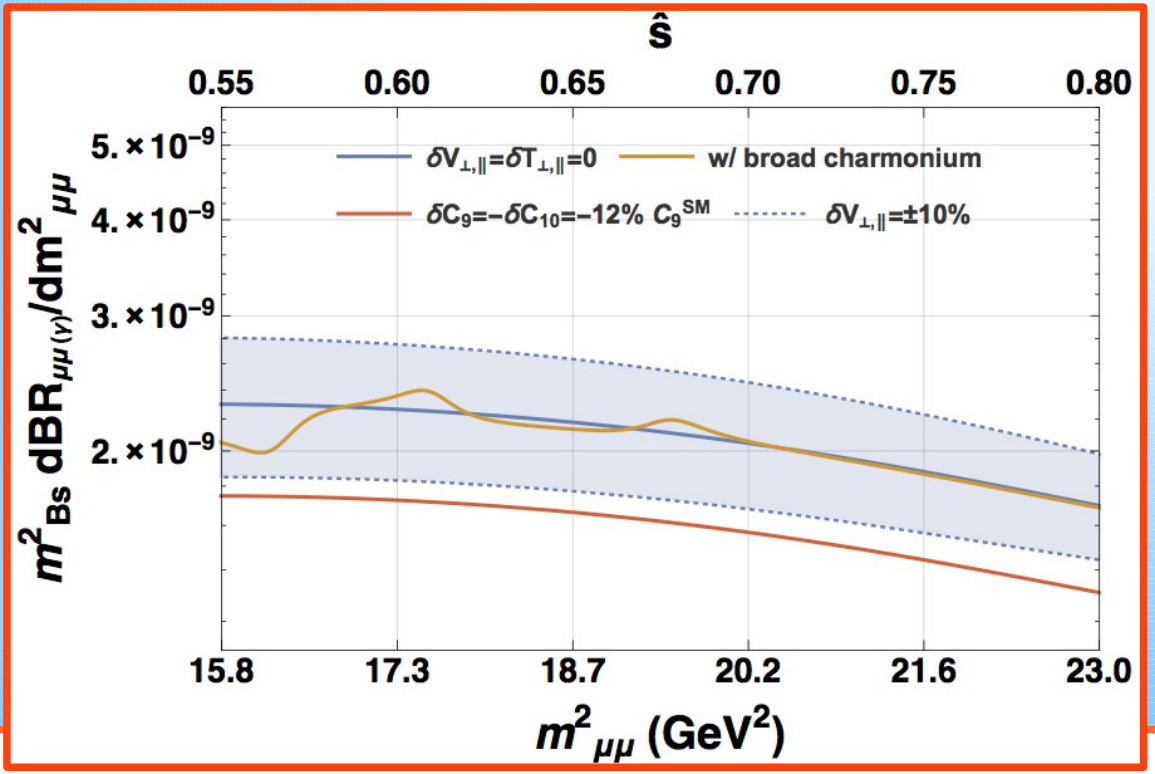

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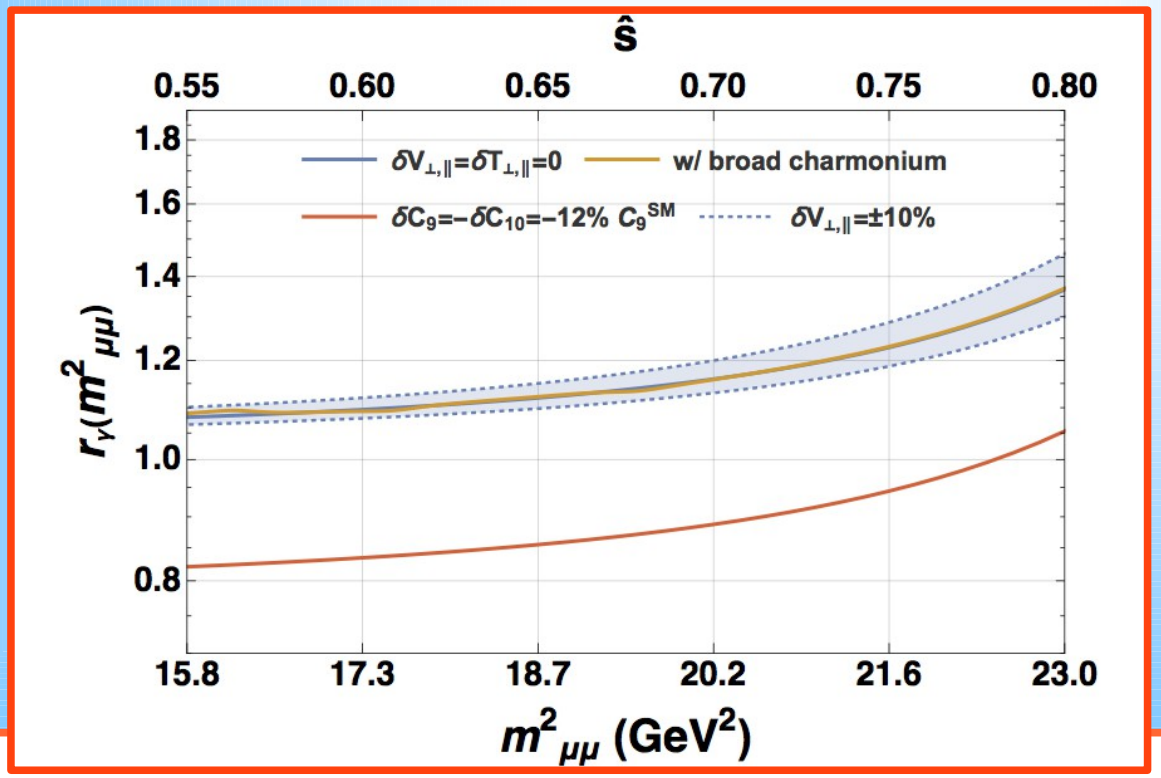

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- *Timely to pursue further tests.*

  Examples:
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  - *other observables sensitive to C_9 & C_{10}*
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