LHCb direct searches at HL-LHC

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on behalf of the LHCb collaboration
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✦ Main goal here, not detailed report (for that see my <u>presentation</u> on June 7th)

➡ Just few slides highlighting the **main messages LHCb would like to be transmitted**

➡ Basically, qualitative statements…

Exp. considerations

- ✦ LHCb **competitive in certain domains** (specially low mass, low p_T objects)

 - ➡ Some advantages

    - **PID** (e.g., RICH to separate particles using their mass)

    - **Momentum resolution**

    - **IP and SV resolution** (good for Long Lived Particles searches)

    - **Soft triggers** (moving towards purely software based trigger after LS2)
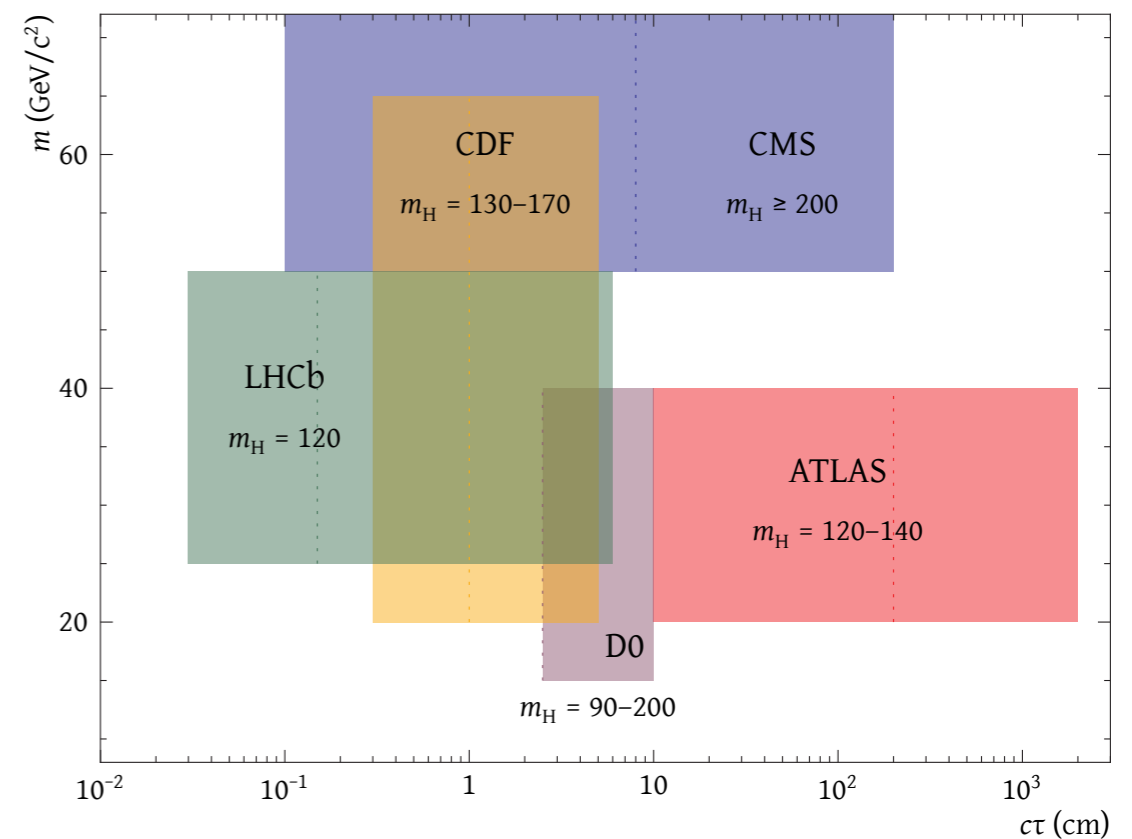
Example from LLP→di-jet analysis [Eur. Phys. J. C75]

Models

✦ In general, sensitive to BSM predicting **light exotic particles** (prompt or detached).

➡ Examples: dark photons, emerging jets, …
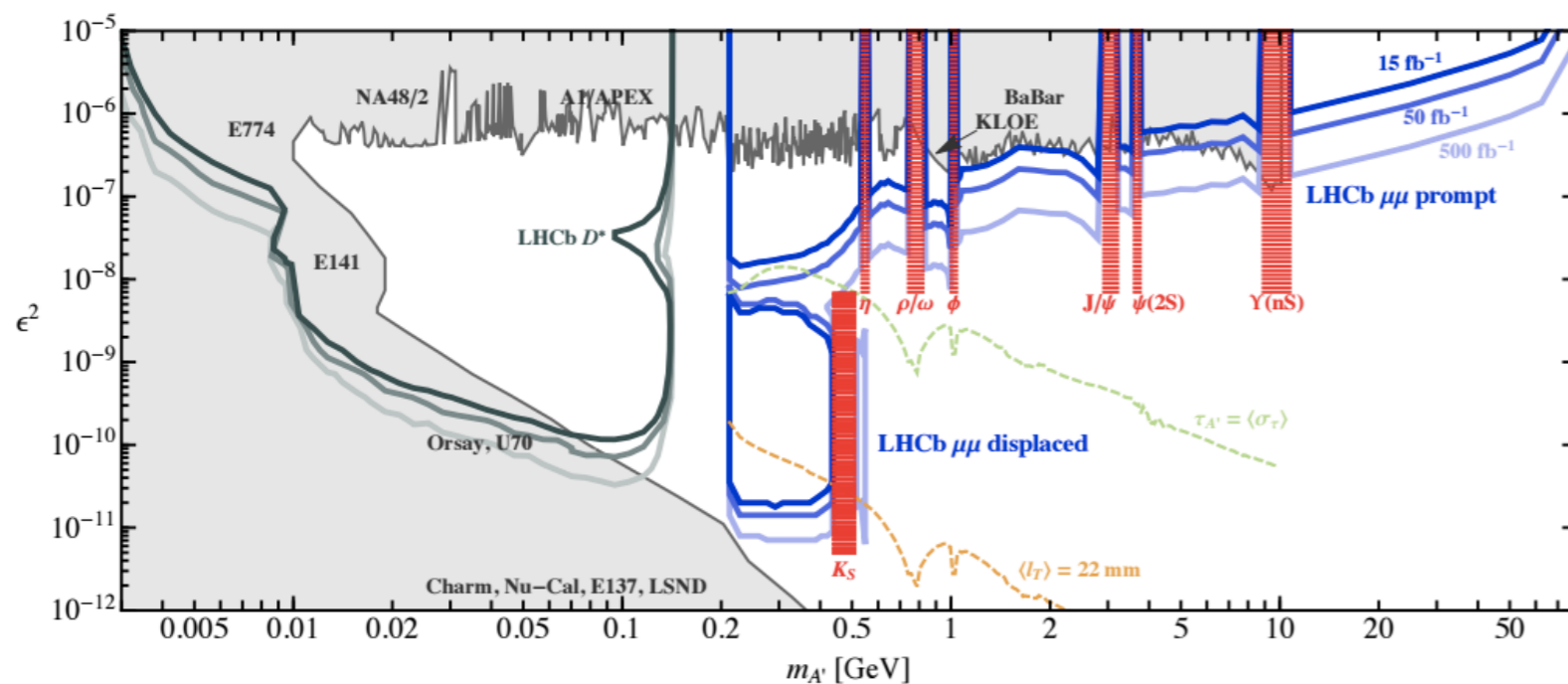
➡ Some theory references

- arXiv:1603.08926
- arXiv:1509.06765
- arXiv:1601.05110
- arXiv:1502.05409

LHCb future

- ✦ LS2: upgrade of LHCb detector to allow running at higher luminosity
  - ➡ upgrade of vertex detector, tracking system, PID.
  - ➡ upgrade of all electronics to allow **trigger-less (40 MHz) readout. 100% efficiency on key channels**

- ✦ 2020~2030: run at ~5x higher luminosity to **collect about 50 fb^{-1}** (pile-up~1-2)

- ✦ Beyond 2030… High Luminosity LHCb? Collect 300 fb^{-1} at pile-up ~50?
  - ➡ Would require Phase-2 upgrade (new detectors?). Under discussion…!