

Search for the $\Sigma^+ \rightarrow p \mu^+ \mu^-$ rare decay at LHCb

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A search for the $\Sigma^+ \rightarrow p \mu^+ \mu^-$ decay at the LHCb experiment is presented.

This is a flavour changing neutral current sensitive to physics beyond the Standard Model, which could modify its properties.

In particular the HyperCP experiment years ago presented an evidence of this decay with a hint of a possible unknown intermediate particle.

This was excluded by LHCb already in 2018. A new measurement, exploiting Run 2 data, is sensitive to a highly significant observation and a measurement of its integrated and differential branching fraction. This would be the rarest baryon decay ever observed.

Additionally, the sensitivity of these observables to Chiral Perturbation Theory parameters will be discussed.

Finally prospects for additional observables, such as a CP violation measurement, will also be presented.

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