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Searches for violation of lepton flavour and baryon number in tau lepton decays at LHCb

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We report on searches for the lepton-flavour violating decay $\tau^- \rightarrow \mu^- \mu^+ \mu^-$ and the lepton-flavour and baryon-number violating decays $\tau^- \rightarrow p \mu^- \mu^-$ and $\tau^- \rightarrow \bar{p} \mu^+ \mu^-$, carried out using 1.0 inverse femtobarn of proton-proton collision data taken by the LHCb experiment at 7 TeV during 2011.

No evidence has been found for any signal, and limits have been set at 90% confidence level on the branching fractions: $\text{BF}(\tau^- \rightarrow \mu^- \mu^+ \mu^-) < 8.0 \times 10^{-8}$,

$\text{BF}(\tau^- \rightarrow p \mu^- \mu^-) < 3.3 \times 10^{-7}$ and $\text{BF}(\tau^- \rightarrow \bar{p} \mu^+ \mu^-) < 4.6 \times 10^{-7}$.

The result for $\text{BF}(\tau^- \rightarrow \mu^- \mu^+ \mu^-)$ is consistent with previous limits, while the measurements of the $\tau^- \rightarrow p \mu^- \mu^-$ and $\tau^- \rightarrow \bar{p} \mu^+ \mu^-$ decay modes represent the first experimental limits on these channels.

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