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B lifetime and $B^0 - \bar{B}^0$ mixing results from early Belle II data

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Summary

The Belle II experiment at the SuperKEKB energy-asymmetric e^+e^- collider is a substantial upgrade of the B factory facility at the Japanese KEK laboratory. The design luminosity of the machine is $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than its predecessor. From February to July 2018, the machine has completed a commissioning run, achieved a peak luminosity of $5.5 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$, and Belle II has recorded a data sample of about 0.5 fb^{-1} . Main operation of SuperKEKB has started in March 2019. We use this dataset to characterize the performance of the detector regarding the tracking of charged particles, the reconstruction of known resonances, and the capability of identifying displaced decay vertices. To assess the B Physics capabilities of the experiment, one of the first benchmarks consists in the measurement of the lifetime of B mesons and of the $B^0 - \bar{B}^0$ mixing frequency. We present the first results, based on samples of B mesons that decay to hadronic and semileptonic final states.

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