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First look at time dependent CP violation using early Belle II data

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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 8×10^{35} cm^{-2}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 5.5×10^{33} cm^{-2}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. This early data set is used to establish the performance of the detector in terms of reconstruction efficiency of final states of interest for the measurement of time dependent CP violation, such as $J/\psi K^{(*)0}$, $\eta' K_s$, and ϕK_s. A first assessment of the B flavor tagging capabilities of the experiment will be given, along with estimates of the Belle II sensitivity to the CKM angles ϕ_1/β and ϕ_2/α and to potential New Physics contributions in penguin amplitudes dominated decays and in $b \to s\gamma$ transitions.

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