

MEASUREMENT OF EFFECTIVE $B_s^0 \rightarrow J/\psi K_S^0$ LIFETIME USING RUN-II CMS DATA

Priyanka Sadangi on behalf of the CMS Collaboration¹,
Sanjay Kumar Swain¹, Sergey Polikarpov²

The effective lifetime for the decay $B_s^0 \rightarrow J/\psi K_S^0$ is reported using the data from pp collision at centre of mass energy $\sqrt{s} = 13$ TeV recorded by CMS experiment at the LHC during 2016, 2017 and 2018. The data sample corresponds to an integrated luminosity of 140 fb^{-1} . The measurement uses the two-dimensional unbinned maximum likelihood (UML) fit to B -invariant mass and the decay time to extract the observable. Effective lifetime is measured as $1.59 \pm 0.07(\text{stat}) \pm 0.03(\text{syst}) \text{ ps}$, which is in good agreement with the standard model prediction and stands as the most precise result to date.

Keywords: effective lifetime, reconstruction and selection, boosted decision tree.

Introduction. The study of B decays has significantly enhanced our understanding of the flavor sector in the SM and, notably, the investigation of CP violation. Among the B mesons, neutral B mesons with their oscillating behavior hold particular intrigue. At hadron colliders, neutral B mesons are initially created as flavor eigenstates. However, they propagate into mass eigenstates known as the light and heavy states. These states are combinations of the original flavor states. When CP symmetry remains conserved during the flavor mixing process, the mass eigenstates coincide with the CP eigenstates. These mass eigenstates can exhibit different lifetimes, which may differ from both each other and the average lifetime of B mesons.

Поступила в редакцию 10 июля 2024 г.

После доработки 7 октября 2024 г.

Принята к публикации 8 октября 2024 г.

¹ National Institute of Science Education and Research, India; e-mail: priyanka.sadangi@niser.ac.in.

² Lebedev Physical Institute of the Russian Academy of Sciences.