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Observation of the $\chi_{b1}(3P)$ and $\chi_{b2}(3P)$ and Measurement of their Masses (Article) [\(Open Access\)](#)

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Abstract

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The $\chi_{b1}(3P)$ and $\chi_{b2}(3P)$ states are observed through their $(3S)\gamma$ decays, using an event sample of proton-proton collisions collected by the CMS experiment at the CERN LHC. The data were collected at a center-of-mass energy of 13 TeV and correspond to an integrated luminosity of 80.0 fb⁻¹. The $(3S)$ mesons are identified through their dimuon decay channel, while the low-energy photons are detected after converting to e^+e^- pairs in the silicon tracker, leading to a $\chi_{b1}(3P)$ mass resolution of 2.2 MeV. This is the first time that the $J=1$ and 2 states are well resolved and their masses individually measured: $10513.42 \pm 0.41(\text{stat}) \pm 0.18(\text{syst})$ MeV and $10524.02 \pm 0.57(\text{stat}) \pm 0.18(\text{syst})$ MeV; they are determined with respect to the world-average value of the $\chi_{b1}(3S)$ mass, which has an uncertainty of 0.5 MeV. The mass splitting is measured to be $10.60 \pm 0.64(\text{stat}) \pm 0.17(\text{syst})$ MeV. © 2018 CERN.

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Biino, C. (2019) *Journal of Physics: Conference Series*Threshold corrections of $\chi_{c1}(2P)$ and $\chi_{c2}(2P)$ states and $J/\psi\gamma$ and $J/\psi\omega$ transitions of the $\chi(3872)$ in a coupled-channel modelFerretti, J. , Santopinto, E. (2019) *Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics*[View all 9 citing documents](#)

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