

Reconstruction of signal amplitudes in the CMS electromagnetic calorimeter in the presence of overlapping proton-proton interactions

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JOURNAL OF INSTRUMENTATION
Volume: 15 Issue: 10
Article Number: P10002
DOI: 10.1088/1748-0221/15/10/P10002
Published: OCT 2020
Document Type: Article
[View Journal Impact](#)

Abstract

A template fitting technique for reconstructing the amplitude of signals produced by the lead tungstate crystals of the CMS electromagnetic calorimeter is described. This novel approach is designed to suppress the contribution to the signal of the increased number of out-of-time interactions per beam crossing following the reduction of the accelerator bunch spacing from 50 to 25 ns at the start of Run 2 of the LHC. Execution of the algorithm is sufficiently fast for it to be employed in the CMS high-level trigger. It is also used in the offline event reconstruction. Results obtained from simulations and from Run 2 collision data (2015-2018) demonstrate a substantial improvement in the energy resolution of the calorimeter over a range of energies extending from a few GeV to several tens of GeV.

Keywords

Author Keywords: [Large detector-systems performance](#); [Pattern recognition](#), [cluster finding](#), [calibration and fitting methods](#)

KeyWords Plus: [SYSTEM](#)

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IOP PUBLISHING LTD, TEMPLE CIRCUS, TEMPLE WAY, BRISTOL BS1 6BE, ENGLAND

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Impact Factor: [Journal Citation Reports](#)

Categories / Classification

Research Areas: Instruments & Instrumentation

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