

## Evidence of intrinsic charm quarks in the proton

*Friday, 20 October 2023 09:30 (30 minutes)*

Quantum Chromodynamics describes the proton as a bound state of quarks and gluons. However, it is unclear whether the heavy quarks, i.e. quarks whose mass is larger than the proton mass, take part to the non-perturbative dynamics of the proton. They are the so-called intrinsic heavy quarks. It has been discussed for a long time that the charm quark, that is the lightest heavy quark and its mass sits slightly above the proton mass, could have a non-negligible intrinsic component. However, so far all the efforts to establish the presence of an intrinsic charm remained inconclusive. Here, disentangling the non-perturbative component from charm-anticharm pairs arising from high-energy radiation, we provide evidence of intrinsic charm in the proton by exploiting a high-precision determination of the quark-gluon content of the proton based on machine learning and a large experimental dataset. We confirm these findings by comparing to very recent data on Z-boson production with charm jets from the LHCb experiment.

### Parallel Session

Invited Plenary Talk

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