

# Hadroproduction of Charm Mesons

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## ABSTRACT

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We measure forward and differential cross-sections, the latter with respect to Feynman- $x$  ( $x_F$ ) and transverse momentum ( $p_T$ ), for production of  $D^+$ ,  $D^0$ ,  $D_s$ , and  $D^{*+}$  in collisions of  $\pi^\pm$ ,  $K^\pm$ , and  $p$  on a nuclear target. These results provide unique information on the beam dependence of charm production. In addition to significant high-statistics contributions to current knowledge on  $\pi^-$  and  $p$ -induced production, we present the first precise  $K^-$  beam measurements as well as the only measurements for  $\pi^+$  and  $K^+$ . These results are compared to predictions of next-to-leading order (NLO) perturbative QCD using modern parametrizations of the pion and nucleon parton distributions. Production induced by different beam particles is found to be the same within statistics. Strange final states are seen to contribute appreciably to the total charm cross-section, which our measurements indicate is larger than but consistent with QCD predictions. The energy dependence mapped out by these and previous measurements is consistent with theory. We observe in the shapes of the differential cross-sections the differences expected in production induced by projectiles with different gluon distributions, harder distributions being indicated for mesons than for protons. Leading-particle asymmetry measurements for  $K$  and  $p$ -induced charm production are also presented.

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For Ling-Yi and Giselle

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