

Abstract Submitted  
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**An analytic determination of the gluon distribution function from HERA combined data for the proton structure function  $F_2^{\gamma p}(x, Q^2)$**  PHUOC HA, Towson University — We exploit a new method based on Laplace transforms to find an exact analytic solution of the leading-order (LO) gluon distribution function  $G(x, Q^2) = xg(x, Q^2)$  directly from the proton structure function  $F_2^{\gamma p}(x, Q^2)$ . The method uses only the LO DGLAP evolution equation for  $F_2^{\gamma p}(x, Q^2)$  without making any assumptions about the shape of the low  $x$  gluon distributions. Using an accurate, new global parametrization of the complete set of low Bjorken- $x$  HERA data on  $F_2^{\gamma p}(x, Q^2)$ , including the data at very low  $Q^2$ , we determine the gluon distribution  $G(x, Q^2)$  for massless quarks and compare our results to other published gluon distributions. An extension of the present method to determine the NLO corrections to the gluon distributions is also presented.

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