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Higgs Boson Production with a Single Bottom Quark at Hadron Colliders
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SALLY DAWSON, BNL, DOREEN WACKEROTH, SUNY at Buffalo — Recently,
the production of Higgs bosons with bottom quarks has received much interest from
both the theoretical and experimental communities. This interest is due to the fact
that, for large values of tan $\beta$, $bh$ production is expected to be a viable discovery
mode for supersymmetric Higgs bosons at present and future colliders. Currently,
there are two approaches to calculating the theoretical prediction of $bh$ produc-
tion. In the five-flavor-number scheme, potentially large logarithms, which arise
from collinear $g\bar{b}$ splitting, can be resummed by a bottom quark Parton Distribu-
tion Function. Alternatively, in the four-flavor-number scheme, one can compute
the cross section for $p\bar{p}, pp \rightarrow bh$ at fixed order in QCD without resumming higher
order collinear logarithms. The $bh$ production mode is actively being searched for
at the Tevatron, by both D0 and CDF collaborations, and, thus, precise predictions
for total and differential cross sections are imperative. We have calculated the cross
section for $p\bar{p}, pp \rightarrow bh$ at next-to-leading order (NLO) in QCD using the four-flavor-
number scheme and present our results for the total cross section and distributions.
We also compare our fixed-order results for the cross section and distributions with
those of the resummed calculation using the five-flavor-number scheme and show
that the NLO cross sections calculated in the two schemes are compatible within
the theoretical uncertainty.

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