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Light charged Higgs boson with dominant decay to a charm quark and a bottom quark and its search at LEP2 and future e^+e^- colliders

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Content :

The possibility of light charged Higgs boson H^{\pm} that decays predominantly to cb and with a mass in the range $80 \text{ GeV} \leq M_{H^{\pm}} \leq 90 \text{ GeV}$ is studied in the context of a 3-Higgs Doublet Model (3HDM). Searches for this decay at the Large Hadron Collider (LHC) do not have the sensitivity to this mass region at present. It is shown that the searches for H^{\pm} at LEP2 could be supplemented by either one or two b -tags, which would enable such large branching ratios for $H^{\pm} \rightarrow cb$ to be probed in the above mass region. We comment on the possibility of this 3HDM scenario to explain a slight excess in the searches for H^{\pm} at LEP2, which is the best fit by $M_{H^{\pm}}$ of around 90 GeV, and discuss the prospects for detecting $H^{\pm} \rightarrow cb$ decays at future e^+e^- colliders.

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