

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Search for the Standard Model Higgs Boson at D0 in the final state $\tau\tau$ jet jet

By

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The Standard Model Model is a very successful description of particle physics, and its predictions have stood up to a multitude of precision experimental tests. But one of the central elements of the Standard Model, the Higgs mechanism, has yet to be verified. The Higgs mechanism (and the associated Higgs Boson) generates electroweak symmetry breaking and consequently allows for W and Z bosons and fermions to be massive. This thesis presents a search for the Standard Model Higgs boson done at the D0 experiment at the Tevatron particle accelerator at Fermilab in the final state $\tau\tau + jet\ jet$ using 4.3 1/fb of data. This final state is sensitive to the Higgs production mechanisms gluon gluon fusion, vector boson fusion, and associated Higgs production with a W or Z, for Higgs masses from 100 to 200 GeV. We see no evidence for the Higgs boson, but by itself, our search does not rule out the Standard Model Higgs. When this analysis is combined with other searches at the Tevatron the Higgs can be ruled out at a 95% confidence level for the mass range from 158 to 173 GeV.

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