Prepared for the
14th International Workshop on Deep Inelastic Scattering, DIS2006, April 20-24, 2006, Tsukuba, Japan
www-h1.desy.de/publications/H1preliminary.short_list.html
H1prelim-06-062

Search for Excited Neutrinos in $e^{-}p$ collisions at HERA

H1 Collaboration

Abstract

We present a search for excited neutrinos using $e^{-}p$ data collected in 2005 by the H1 experiment at HERA at center-of-mass energy of 318 GeV with an integrated luminosity of 114 pb^{-1}. The electroweak decay of excited neutrinos, $\nu^{*} \rightarrow \nu\gamma$, $\nu^{*} \rightarrow \nu Z$, $\nu^{*}\rightarrow eW$ are considered and possible final states resulting from the Z or W hadronic decays are taken into account. No evidence for excited neutrino production is found. Mass dependent exclusion limits are determined for the ratio of the coupling to the compositeness scale, f/Λ. These limits extend the excluded region to higher masses than has been possible in previous searches.

H1 Preliminary 114 pb^{-1} (2005)

Selection	Data	SM	CC-DIS	NC-DIS	γp
$\nu^*\to eW_{\hookrightarrow qq}$	136	118 ± 22	—	112 ± 21	4.4 ± 1.2
$\nu^*\to \nu Z_{\hookrightarrow qq}$	88	81 ± 15	54 ± 13	5 ± 1.6	22 ± 5
$\nu^*\to \nu\gamma$	12	11.6 ± 2.5	9.1 ± 2.4	1.3 ± 0.3	0.4 ± 0.15

Table 1: Observed and predicted event yields for the $\nu\gamma$, $\nu Z_{\hookrightarrow qq}$, $eW_{\hookrightarrow qq}$ event classes. The analysed data sample corresponds to an integrated luminosity of 114 pb^{-1}. The errors on the prediction include model uncertainties and experimental systematic errors added in quadrature.

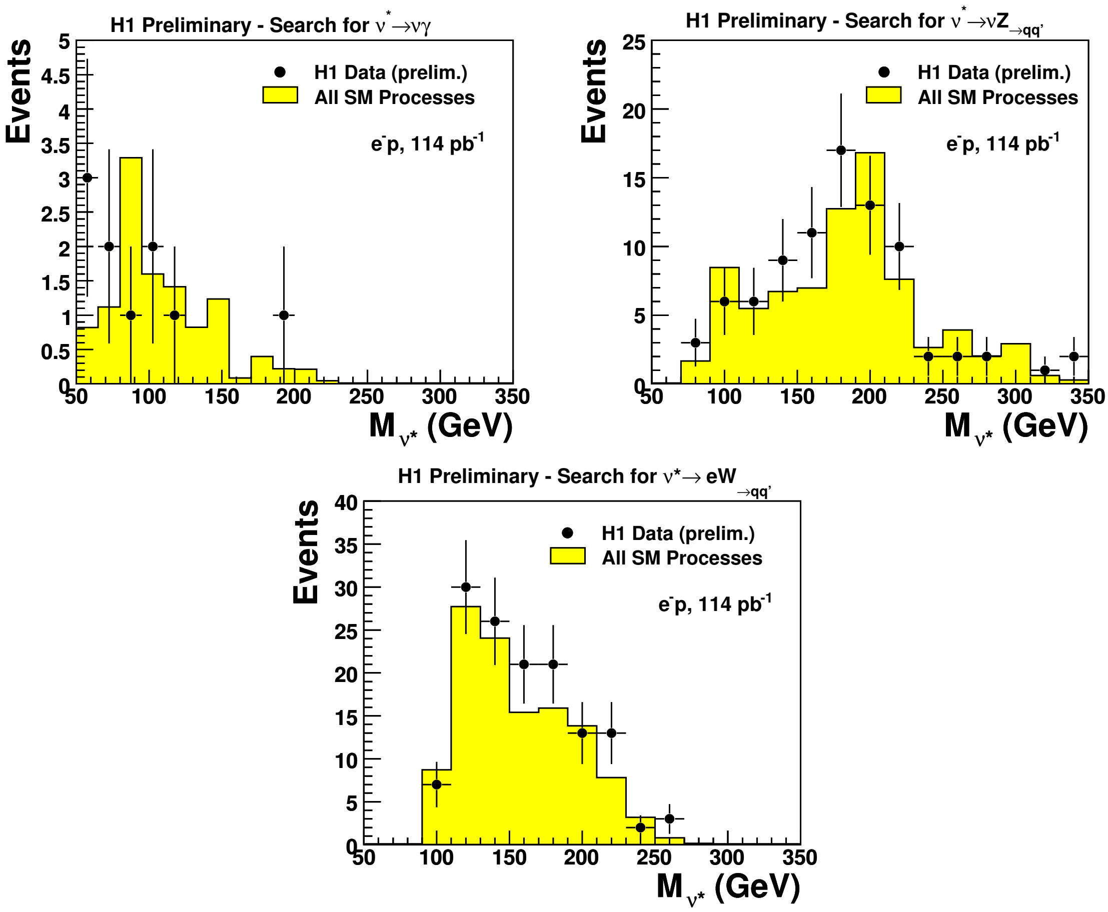

Figure 1: Invariant mass distributions for the (a)$\nu^*\to\nu\gamma$, (b) $\nu^*\to\nu Z_{\hookrightarrow qq}$ and (c) $\nu^*\to eW_{\hookrightarrow qq}$ searches. The points corresponds to the observed data events in the final selections and the yellow histogram to the total SM prediction.

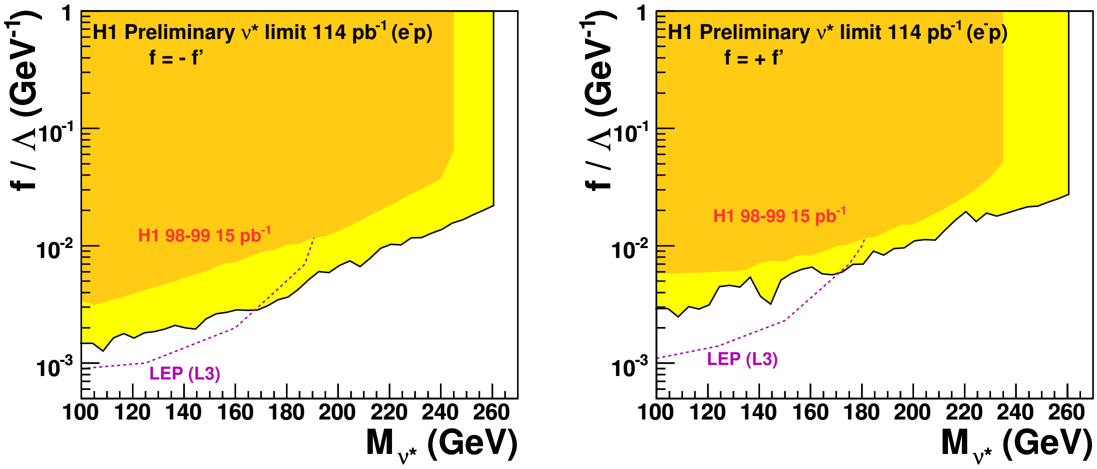

Figure 2: Exclusion limits on f/Λ at 95% C.L. as a function of the mass of the excited neutrino. The assumptions $f = -f'$ and $f = +f'$ are made for figure (a) and (b) respectively. The observed limits from this analysis using 2005 $e^{-}p$ data is represented by the yellow area. Values of the couplings above the curves are excluded. The orange area corresponds to the exclusion domain published by the H1 experiment using 98/99 data and the violet-dashed line to exclusion limit from the L3 experiement at LEP.