H1-prelim-02-061
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SEARCH FOR EXCITED ELECTRONS AT HERA

H1 Collaboration

Abstract

We have performed a search for excited electron (e^*) production, considering all electroweak decays $e^* \rightarrow e + \gamma$, $e^* \rightarrow eZ$, $e^* \rightarrow \nu W$ and final states resulting from Z or W hadronic decays, using a sample of $e^{\pm}p$ events corresponding to 120 pb^{-1} of data collected from 1994 to 2000 with the H1 detector at HERAat a center of mass energy of 300 and 318 GeV. No evidence for a signal is found. We derive mass dependent exclusion limits for the ratio of the couplings to the compositeness scale f/Λ. These limits extend the excluded region to higher masses than has been possible in previous searches for excited electrons.

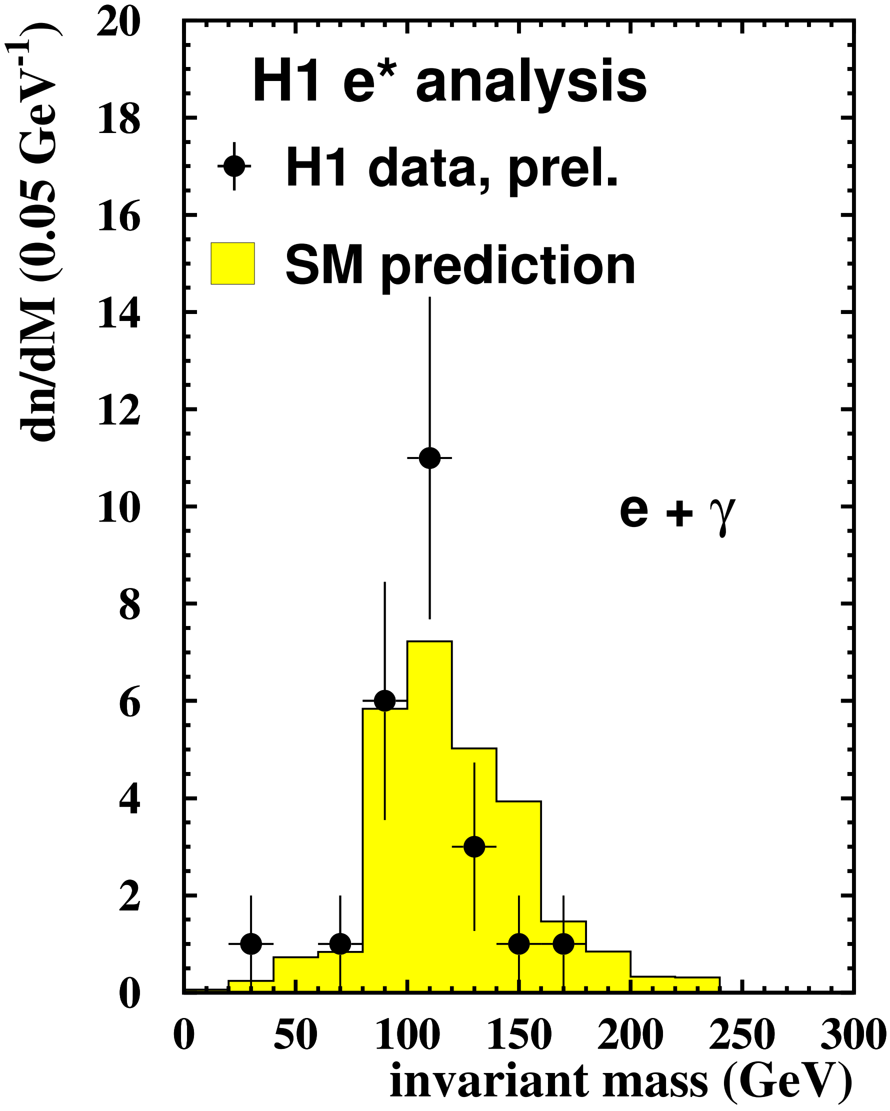

Figure 1: Invariant mass spectrum of the two electromagnetic clusters for the $e^* \rightarrow e+\gamma$ analysis. Solid points correspond to the data and the histogram to the total expectation from different Standard Model processes.

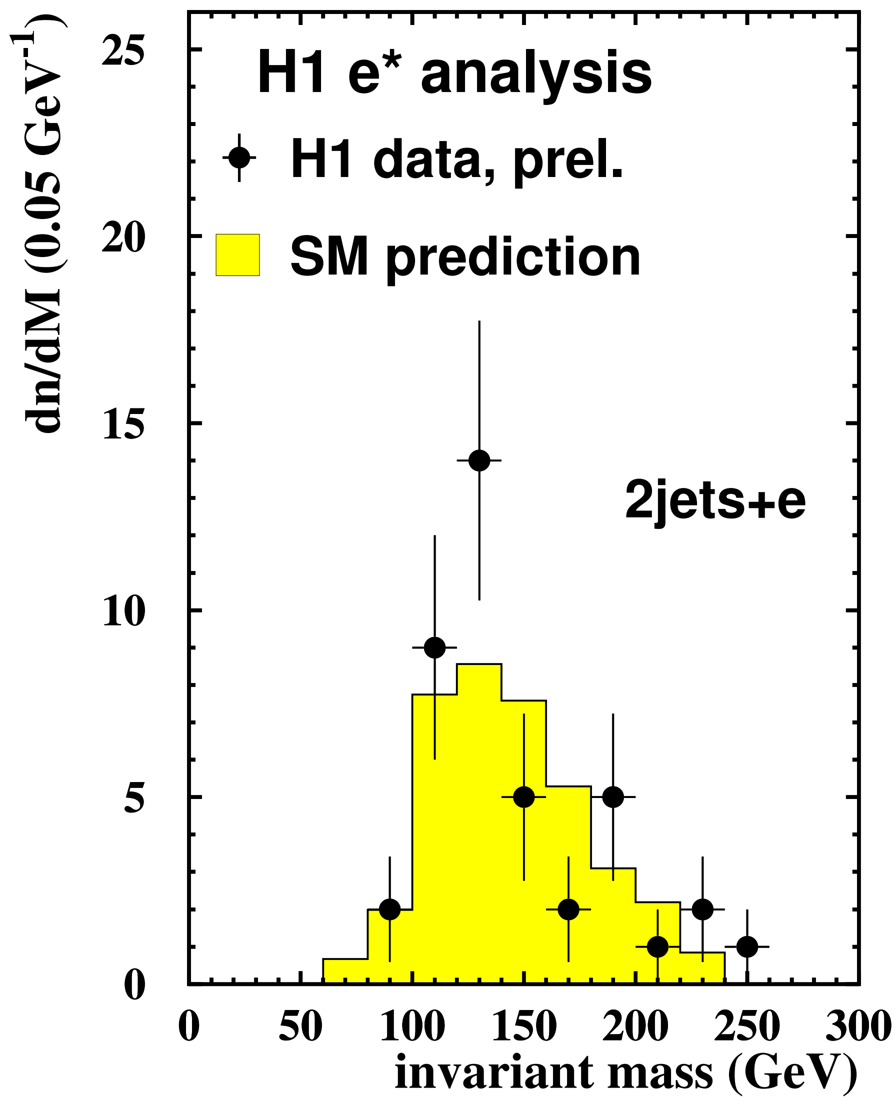

Figure 2: Invariant mass spectrum of the electromagnetic cluster and the 2 jets for the $e^* \to e + Z_{\hookrightarrow qq}$ analysis. Solid points correspond to the data and the histogram to the total expectation from different Standard Model processes.

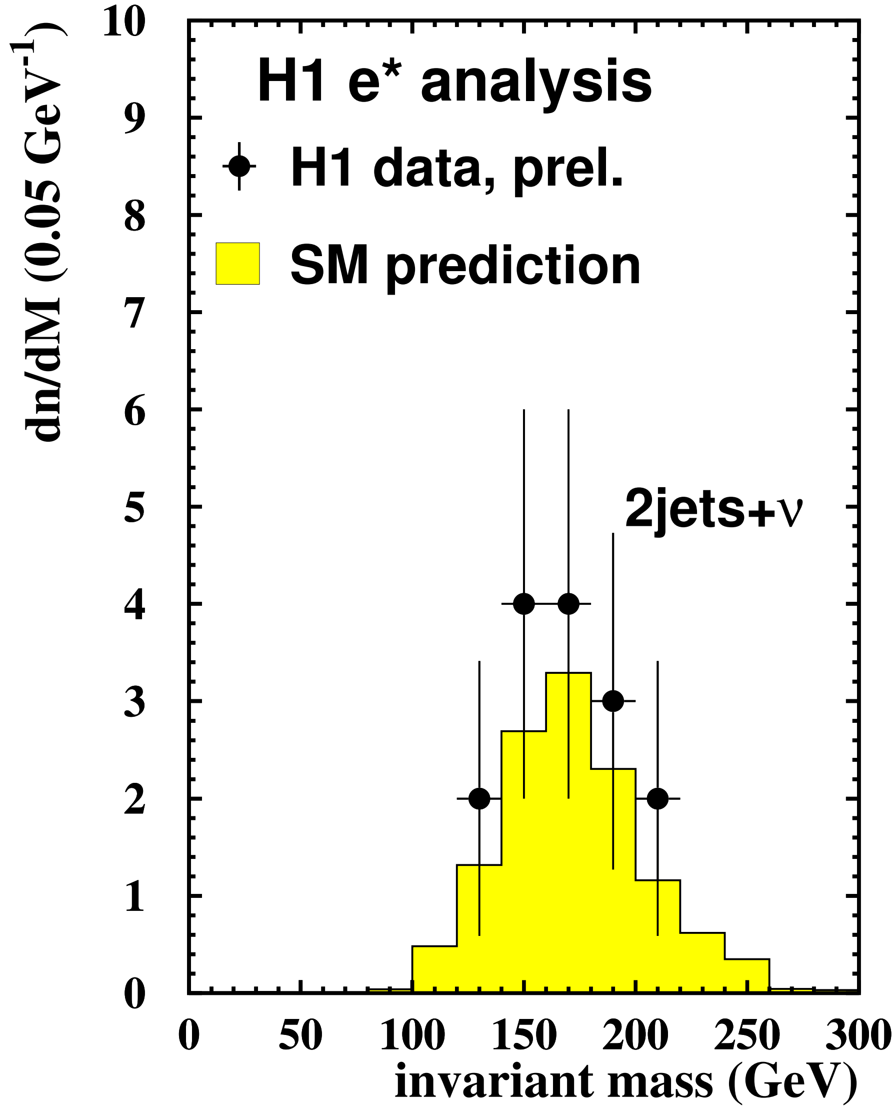

Figure 3: Invariant mass spectrum of the two jets and the $\not{E}_t$ for the $e^* \rightarrow \nu + W_{\hookrightarrow qq}$ analysis. Solid points correspond to the data and the histogram to the total expectation from different Standard Model processes.

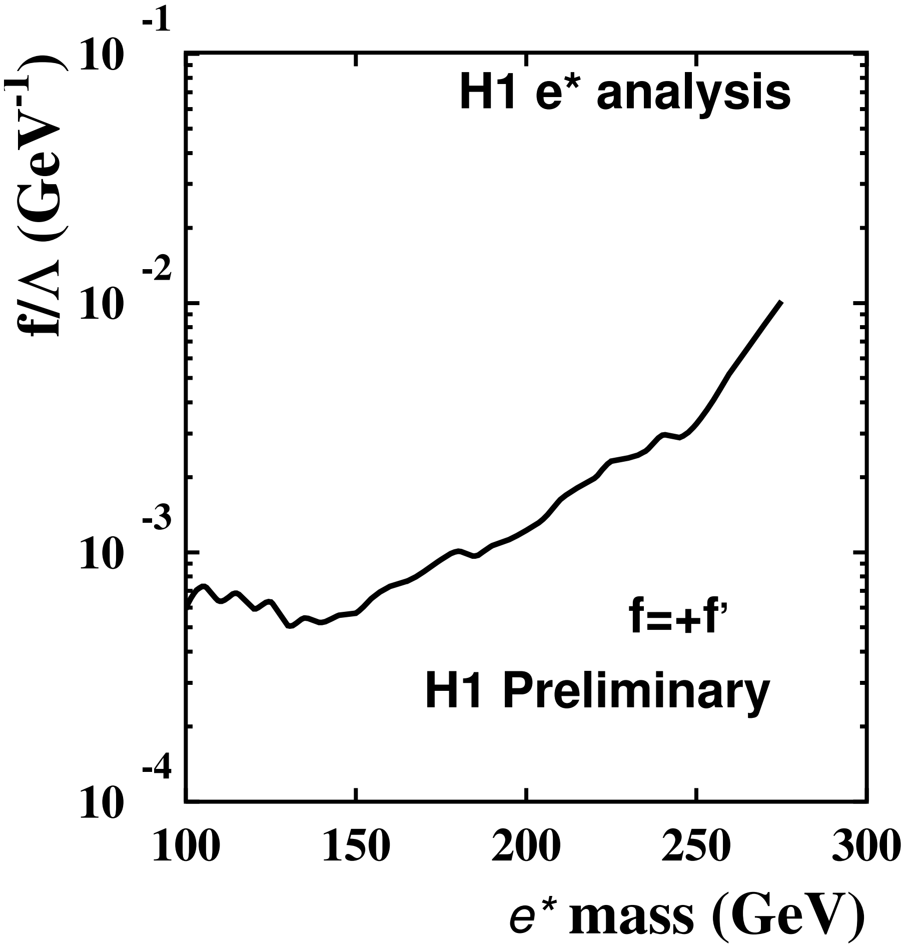

Figure 4: Exclusion limits on the coupling f/Λ at 95% confidence level as a function of the mass of excited electrons with the assumptions $f = +f'$. On this figure the limit is shown for the combination of the 3 channels.

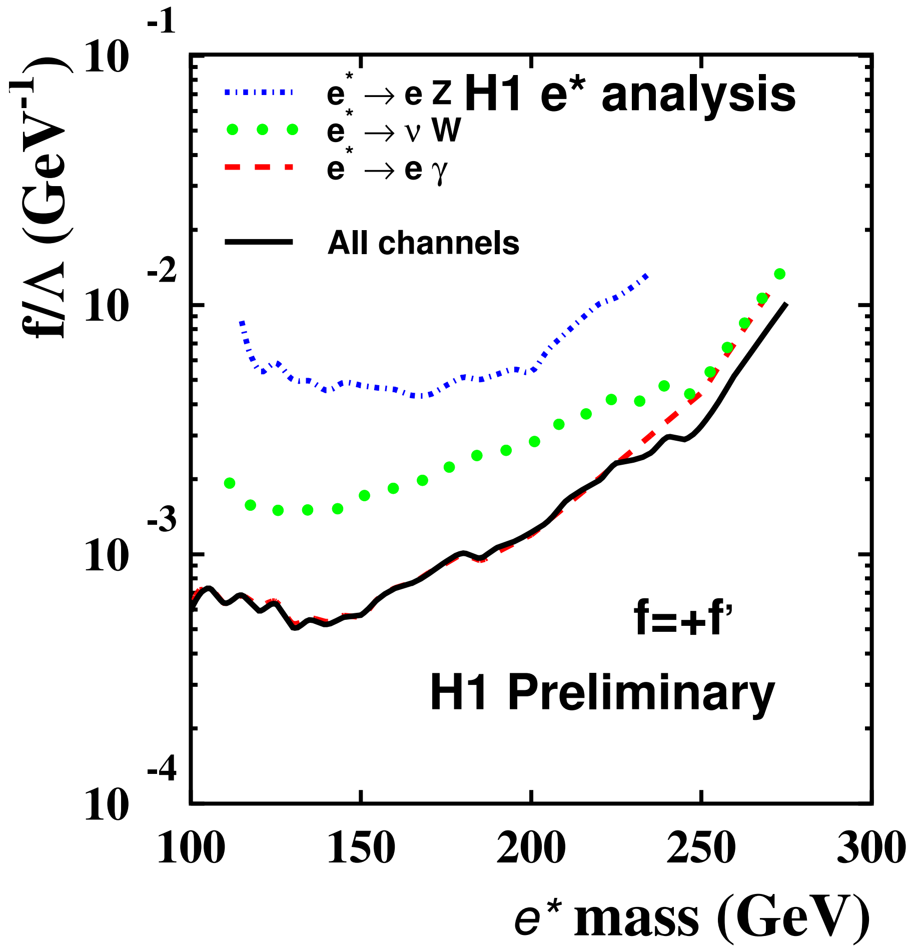

Figure 5: Exclusion limits on the coupling f/Λ at 95% confidence level as a function of the mass of excited electrons with the assumptions $f = +f'$. On this figure the limit is shown for each decay channel separately: $e^* \rightarrow e + \gamma$ (dashed line) - $e^* \rightarrow e + Z_{\hookrightarrow qq}$ (dotted-dashed line) - $e^* \rightarrow \nu + W_{\hookrightarrow qq}$ (dotted line) and for the combination of the 3 channels (full line).

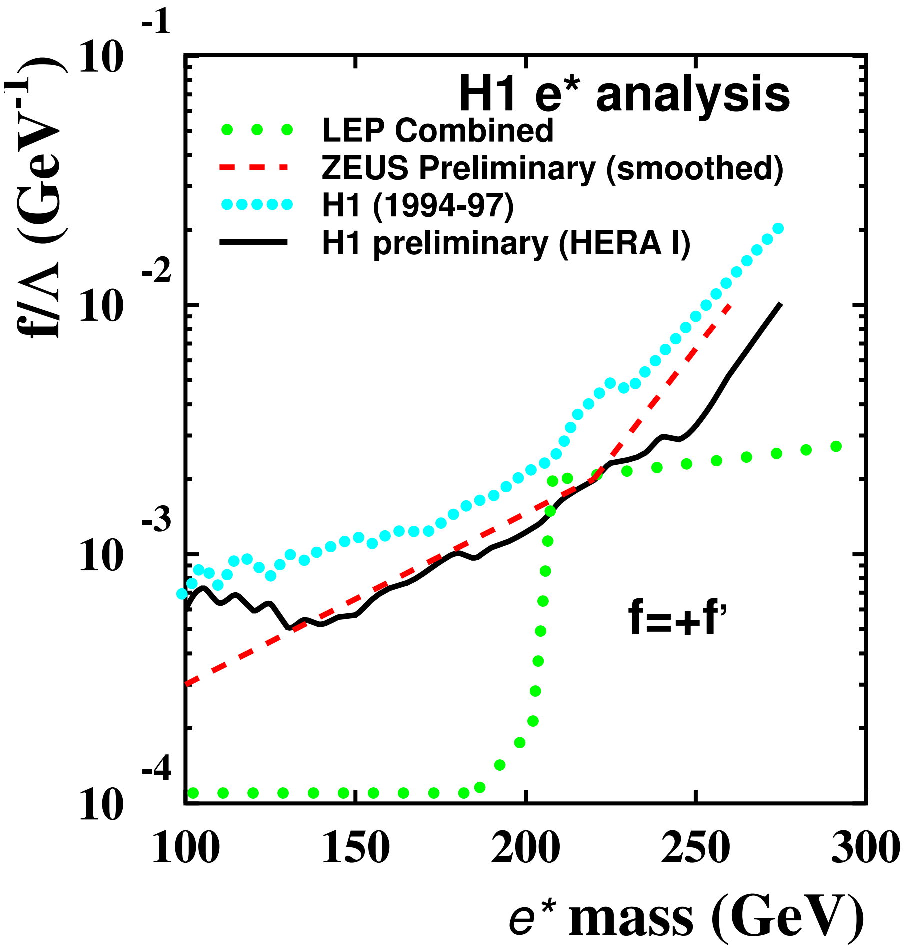

Figure 6: Exclusion limits on the coupling f/Λ at 95% confidence level as a function of the mass of excited electrons with the assumptions $f = +f'$. On this figure a comparison of this analysis is made with previous H1 results (blue dotted line), with ZEUS results (green dashed line) and for a combination of the LEP results (green spaced-dotted line). It must be noted that the data used in the previous H1 analysis are included in the present result.

Sample		ϵ (%) 150-250 GeV	Data	SM exp.
	e^+p 820 GeV	85-79	8	$7.2 \pm 1.0 \pm 0.1$
$e^* \rightarrow e + \gamma$	e^-p 920 GeV	84-74	4	$4.0 \pm 0.7 \pm 0.2$
	e^+p 920 GeV	84-74	12	$15.6 \pm 1.7 \pm 0.4$
	e^+p 820 GeV	42-63	6	$7.1 \pm 2.1 \pm 2.8$
$e^* \rightarrow e + Z_{\hookrightarrow qq}$	e^-p 920 GeV	44-63	4	$5.6 \pm 0.4 \pm 1.2$
	e^+p 920 GeV	44-63	31	$25.3 \pm 1.9 \pm 5.5$
	e^+p 820 GeV	29-53	2	$2.4 \pm 0.2 \pm 0.7$
$e^* \rightarrow \nu + W_{\hookrightarrow qq}$	e^-p 920 GeV	28-56	5	$3.9 \pm 0.2 \pm 0.7$
	e^+p 920 GeV	28-56	8	$6.1 \pm 0.4 \pm 1.5$

e^+p 820 GeV: 37 pb^{-1} e^-p 920 GeV: 15 pb^{-1} e^+p 920 GeV: 68 pb^{-1}