The decay $D^0 \to K^- e^+ \nu_e$ is the only one so far that allows a useful study of the q^2 dependence of heavy-meson form factors. Experiments to date are precise enough to determine only an intercept and a slope parameter for the function $f_+^K(q^2)$. This form factor is commonly parametrized with a pole form,

$$f_+^K(q^2) = f_+^K(0)/(1 - q^2/m_p^2) \ , \tag{5}$$

where m_p is an appropriate pole mass, expected to be approximately the mass of the D_s^*. Values of m_p derived from the experiments are given in Table 1 and are in agreement with $m_{D_s^*}$. The form-factor intercept is computed by integrating Eq. (1), assuming the pole form for $f_+^K(q^2)$. Using the average transition rate of the two charge states, the result is $|f_+^K(0)||V_{cs}| = 0.73 \pm 0.02 \pm 0.02$, where the first error is from the uncertainty in the decay rate and the second is from the uncertainty in the shape of $f_+^K(q^2)$. Using $|V_{cs}| = 0.974$ from the unitarity of the CKM matrix, the value $f_+^K(0) = 0.75 \pm 0.02 \pm 0.02$ is obtained. This result is in general agreement with predictions from models and lattice gauge calculations, as shown in Table 8.

$D \to \overline{K}^* \ell^+ \nu_\ell$ decays

The differential decay distribution for $D \to \overline{K}^* \ell^+ \nu_\ell$ is governed, as explained in Section II, by one vector and two axial-vector form factors. Experiments do not yet have enough data to measure the q^2 dependences of these form factors. The practice is to assume that they have a simple pole form, as for the pseudoscalar case, using for pole masses those of the lowest lying $c\overline{s}$ states with the appropriate quantum numbers: the D_s^* mass, 2.1 GeV, for the pole mass m_V, and the D_s^{**} mass, 2.5 GeV, for m_A. The ratios of form-factor intercepts, $R_2 = A_2(0)/A_1(0)$ and $R_V = V(0)/A_1(0)$, are then determined by fitting to the q^2 and angular decay distributions. These ratios have been measured in $D^+ \to \overline{K}^{*0} \ell^+ \nu_\ell$ decay and are given in Table 3. The corresponding ratios of longitudinal to transverse polarization, and of positive to negative transverse polarization, are also shown.

Table 3: $D^+ \to \overline{K}^{*0} \ell^+ \nu_\ell$ form factor ratios.

Experiment	Ref.	$R_2(0)$	$R_V(0)$	Γ_L/Γ_T	Γ_+/Γ_-
E691	[12]	$0.0 \pm 0.5 \pm 0.2$	$2.0 \pm 0.6 \pm 0.3$	$1.8^{+0.6}_{-0.4} \pm 0.3$	$0.15^{+0.07}_{-0.05} \pm 0.03$
E653	[13]	$0.82^{+0.22}_{-0.23} \pm 0.11$	$2.00^{+0.34}_{-0.32} \pm 0.16$	$1.18 \pm 0.18 \pm 0.08$	$0.16 \pm 0.05 \pm 0.02$
E687	[16]	$0.78 \pm 0.18 \pm 0.10$	$1.74 \pm 0.27 \pm 0.28$	$1.20 \pm 0.13 \pm 0.13$	
Ave.		0.73 ± 0.15	1.89 ± 0.25	1.23 ± 0.13	0.16 ± 0.04

The normalization of the form factors is given by the transition rate, which is proportional to $A_1(0)^2$ and is only weakly dependent on R_V and R_2. Tables 4 and 5 give measurements of the $D^+ \to \overline{K}^{*0} e^+ \nu_e$ and $D^0 \to K^{*-} e^+ \nu_e$ branching fractions with the associated average transition rates in Table 10. The D^+ measurement is the better of the two, due to the long D^+ lifetime, the high efficiency for observing the $\overline{K}^{*0}$, and the recent, more precise measurement of the normalizing $D^+ \to K^- \pi^+ \pi^+$ branching fraction.

Table 4: Measurements of the $D^+ \to \overline{K}^{*0} e^+ \nu_e$ branching fraction.

Experiment	Reference	Lepton	Norm. mode	B($D^+ \to \overline{K}^{*0} e^+ \nu_e$)%
E691	[12] ANJOS 90E	e	$D^+ \to K^- \pi^+ \pi^+$	4.4 ± 0.6
E653*	[18] KODAMA 92C	μ	$D^+ \to K^- \pi^+ \pi^+$	4.4 ± 1.0
			$D^0 \to K^- e^+ \nu_e$	3.9 ± 1.1
E687*	[16] FRABETTI 93E	μ	$D^+ \to K^- \pi^+ \pi^+$	5.4 ± 0.8
WA82	[14] ADAMOVICH 91	e	$D^+ \to K^- \pi^+ \pi^+$	5.6 ± 1.6
ARGUS	[19] ALBRECHT 91	e	$D^+ \to K^- \pi^+ \pi^+$	5.0 ± 1.2
CLEO-II*	[4] BEAN 93C	e, μ	$D^+ \to K^- \pi^+ \pi^+$	6.1 ± 1.1
PDG value				4.8 ± 0.4

*Muon measurements have been scaled up by 1.05 to be equivalent to electrons.

Table 5: Measurements of the $D^0 \to K^{*-} e^+ \nu_e$ branching fraction.

Experiment	Reference	Norm. mode	B($D^0 \to K^{*-} e^+ \nu_e$)%
CLEO-I	[6] CRAWFORD 91B	$D^0 \to K^- e^+ \nu_e$	1.9 ± 0.7
CLEO-II	[4] BEAN 93C	$D^0 \to \overline{K}^0 \pi^+ \pi^-$	2.0 ± 0.4
PDG value			2.0 ± 0.4