Interpretation of $B \to (\eta, \eta')(K, K^*)$

With η/η' mixing angle of -20°

$$\eta = \frac{u\bar{u}+d\bar{d}-s\bar{s}}{\sqrt{3}} \quad \eta' = \frac{u\bar{u}+d\bar{d}+2s\bar{s}}{\sqrt{6}}$$

Mode	T	C	P	H
$\pi^+ K^0$	0	0	1	0
$\pi^\circ K^+$	$\frac{-1}{\sqrt{2}}$	$\frac{-1}{\sqrt{2}}$	$\frac{-1}{\sqrt{2}}$	0
ηK^+	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$
$\eta' K^+$	$\frac{1}{\sqrt{6}}$	$\frac{1}{\sqrt{6}}$	$\frac{3}{\sqrt{6}}$	$\frac{4}{\sqrt{6}}$
ηK^{*+}	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{3}}$	$\frac{-2}{\sqrt{3}}$	$\frac{-1}{\sqrt{2}}$
$\eta' K^{*+}$	$\frac{1}{\sqrt{6}}$	$\frac{1}{\sqrt{6}}$	$\frac{1}{\sqrt{6}}$	$\frac{4}{\sqrt{6}}$

T - Tree; C - Color suppressed; P - Penguin; H - Hairpin

- Ratios $\eta' K/\eta K$, $\eta K^*/\eta' K^*$ large [Lipkin '91]
  Also [Chau *et al.* '91, Gronau&Rosner '96]
- Most predictions for $B \to \eta' K < 4 \times 10^{-5}$. If experimental number stays high, other mechanisms needed to explain it
- $B \to \omega\pi$ and $B \to \omega K$ also 2-3× larger than expected