# $B^{\pm}$ – THIS IS PART 1 OF 2

To reduce the size of this section's PostScript file, we have divided it into two PostScript files. We present the following index:

Page #	Section name
1	Mass
1	Mean life
3	Decay modes
7	Branching ratios
7	Semileptonic and leptonic modes
9	$D, D^*, $ or $D_s $ modes

PART 2

Page #	Section name
	Branching ratios (continued)
20	Charmonium modes
22	$K \text{ or } K^* \text{ modes}$
27	Light unflavored meson modes
31	Baryon modes
32	Rare or forbidden modes
35	References

$$B^{\pm}$$

$$I(J^P) = \frac{1}{2}(0^-)$$

Quantum numbers not measured. Values shown are quark-model predictions.

See also the  $B^{\pm}/B^0$  ADMIXTURE and  $B^{\pm}/B^0/B_s^0/b$ -baryon AD-MIXTURE sections.

#### $B^{\pm}$ MASS

The fit uses  $m_{B^+}$ ,  $(m_{B^0} - m_{B^+})$ ,  $m_{B_s^0}$ , and  $(m_{B_s^0} - (m_{B^+} + m_{B^0})/2)$  to determine  $m_{B^+}$ ,  $m_{B^0}$ ,  $m_{B_s^0}$ , and the mass differences.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
5278.9±1.8 OUR FIT				
5278.9±1.5 OUR AVE	RAGE			
$5279.1 \pm 1.7 \pm 1.4$	147	<sup>1</sup> ABE 9	6b CDF	<i>р<mark>р</mark> at 1.8 ТеV</i>
$5278.8\!\pm\!0.54\!\pm\!2.0$	362	<sup>2</sup> ALAM 9	4 CLE2	$e^+e^-  ightarrow ~\Upsilon(4S)$
$5278.3 \pm 0.4 \pm 2.0$		<sup>2</sup> BORTOLETTO9	2 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$5280.5 \pm 1.0 \pm 2.0$		<sup>2,3</sup> ALBRECHT 9	0J ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$5278.6 \pm 0.8 \pm 2.0$		<sup>2</sup> BEBEK 8	7 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$\bullet \bullet \bullet$ We do not use the	e followi	ng data for averages, f	fits, limits,	etc. • • •
$5275.8 {\pm} 1.3 {\ \pm} 3.0$	32	ALBRECHT 8	7c ARG	$e^+e^-  ightarrow ~\Upsilon(4S)$
$5278.2 \pm 1.8 \pm 3.0$	12	<sup>4</sup> ALBRECHT 8	7d ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>Excluded from fit because it is not independent of ABE 96B  $B_s^0$  mass and  $B_s^0$ -B mass difference.

<sup>2</sup> These experiments all report a common systematic error 2.0 MeV. We have artificially increased the systematic error to allow the experiments to be treated as independent measurements in our average. See "Treatment of Errors" section of the Introductory Text. These experiments actually measure the difference between half of  $E_{\rm cm}$  and the *B* mass.

 $^3$  ALBRECHT 90J assumes 10580 for  $\Upsilon(4S)$  mass. Supersedes ALBRECHT 87C and ALBRECHT 87D.

<sup>4</sup> Found using fully reconstructed decays with  $J/\psi(1S)$ . ALBRECHT 87D assume  $m \gamma(4S) = 10577$  MeV.

### $B^{\pm}$ MEAN LIFE

See  $B^{\pm}/B^0/B^0_s/b$ -baryon ADMIXTURE section for data on *B*-hadron mean life averaged over species of bottom particles.

"OUR EVALUATION" is an average of the data listed below performed by the LEP *B* Lifetimes Working Group as described in our review "Production and Decay of *b*-flavored Hadrons" in the  $B^{\pm}$  Section of the Listings. The averaging procedure takes into account correlations between the measurements and asymmetric lifetime errors.

VALUE $(10^{-12} \text{ s})$	EVTS	DOCUMENT ID		TECN	COMMENT
$1.65\pm0.04$ OUR EVAL	UATION				
$1.68\!\pm\!0.07\!\pm\!0.02$		<sup>5</sup> ABE	<b>98</b> B	CDF	<i>р р</i> at 1.8 ТеV
$1.66\!\pm\!0.06\!\pm\!0.05$		<sup>6</sup> ABE	97J	SLD	$e^+e^- \rightarrow Z$
$1.56\!\pm\!0.13\!\pm\!0.06$		<sup>7</sup> ABE	<b>96</b> C	CDF	<i>р</i> рат 1.8 ТеV
HTTP://PDG.LBL	.GOV	Page 1		Cre	ated: 6/29/1998 12:28

$1.58\!\pm\!0.09\!\pm\!0.04$		<sup>7</sup> BUSKULIC	96J ALEP	$e^+e^- \rightarrow Z$
$1.58 \substack{+0.21 + 0.04 \\ -0.18 - 0.03}$	94	<sup>5</sup> BUSKULIC	96J ALEP	$e^+e^- \rightarrow Z$
$1.61\!\pm\!0.16\!\pm\!0.12$		<sup>7,8</sup> ABREU	95Q DLPH	$e^+e^- \rightarrow Z$
$1.72\!\pm\!0.08\!\pm\!0.06$		<sup>9</sup> ADAM	95 DLPH	$e^+e^- \rightarrow Z$
$1.52\!\pm\!0.14\!\pm\!0.09$		<sup>7</sup> AKERS	95T OPAL	$e^+e^- \rightarrow Z$
• • • We do not use t	he follow	ing data for average	es, fits, limits,	etc. ● ● ●
$1.58\!\pm\!0.09\!\pm\!0.03$		<sup>10</sup> BUSKULIC	96J ALEP	$e^+e^- \rightarrow Z$
$1.70\!\pm\!0.09$		<sup>11</sup> ADAM	95 DLPH	$e^+e^- \rightarrow Z$
$1.61\!\pm\!0.16\!\pm\!0.05$	148	<sup>5</sup> ABE	94d CDF	Repl. by ABE 98B
$1.30^{+0.33}_{-0.29}{\pm}0.16$	92	<sup>7</sup> ABREU	93D DLPH	Sup. by ABREU 95Q
$1.56\!\pm\!0.19\!\pm\!0.13$	134	<sup>9</sup> ABREU	93G DLPH	Sup. by ADAM 95
$1.51^{+0.30}_{-0.28}{}^{+0.12}_{-0.14}$	59	<sup>7</sup> ACTON	93c OPAL	Sup. by AKERS 95⊤
1.47 + 0.22 + 0.15 - 0.19 - 0.14	77	<sup>7</sup> BUSKULIC	93D ALEP	Sup. by BUSKULIC 96J

<sup>5</sup> Measured mean life using fully reconstructed decays. <sup>6</sup> Data analyzed using charge of secondary vertex. <sup>7</sup> Data analyzed using  $D/D^*\ell X$  event vertices. <sup>8</sup> ABREU 95Q assumes  $B(B^0 \rightarrow D^{**-}\ell^+\nu_\ell) = 3.2 \pm 1.7\%$ .

<sup>9</sup>Data analyzed using vertex-charge technique to tag *B* charge. <sup>10</sup>Combined result of  $D/D^*\ell X$  analysis and fully reconstructed *B* analysis.

<sup>11</sup> Combined ABREU 95Q and ADAM 95 result.

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### **B<sup>+</sup> DECAY MODES**

 $B^-$  modes are charge conjugates of the modes below. Modes which do not identify the charge state of the B are listed in the  $B^\pm/B^0$  ADMIXTURE section.

The branching fractions listed below assume 50%  $B^0 \overline{B}{}^0$  and 50%  $B^+ B^-$  production at the  $\Upsilon(4S)$ . We have attempted to bring older measurements up to date by rescaling their assumed  $\Upsilon(4S)$  production ratio to 50:50 and their assumed D,  $D_s$ ,  $D^*$ , and  $\psi$  branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

	Mode	Fraction $(\Gamma_i/\Gamma)$	)	Scale factor/ Confidence level
	Semileptonic and	l leptonic modes		
$\Gamma_1$	$\ell^+  u_\ell$ anything	[a] $(10.3 \pm 0.9$	) %	
Γ2	$\overline{D}{}^0\ell^+ u_\ell$	[ <i>a</i> ] ( 1.86±0.33	) %	
Γ <sub>3</sub>	$\overline{D}^*(2007)^0 \ell^+  u_\ell$	[a] (5.3 $\pm 0.8$	) %	
Г <sub>4</sub>	$\pi^0 e^+ \nu_e$	< 2.2	$\times 10^{-1}$	3 CL=90%
Γ <sub>5</sub>	$\omega \ell^+ \nu_\ell$	[ <i>a</i> ] < 2.1	$\times 10^{-1}$	4 CL=90%
Г <sub>6</sub>	$\omega \mu^+  u_{\mu}$			
Γ <sub>7</sub>	$\rho^0 \ell^+  u_\ell$	[a] < 2.1	$\times 10^{-1}$	4 CL=90%
Г <sub>8</sub>	$e^+ \nu_e$	< 1.5	$\times 10^{-1}$	5 CL=90%
Г9	$\mu^+  u_{\mu}$	< 2.1	$\times 10^{-1}$	5 CL=90%
$\Gamma_{10}$	$\tau^+ \nu_{\tau}$	< 5.7	$\times 10^{-1}$	4 CL=90%
$\Gamma_{11}$	$e^+ \nu_e \gamma$	< 2.0	$\times 10^{-1}$	4 CL=90%
Γ <sub>12</sub>	$\mu^+  u_\mu \gamma$	< 5.2	$\times 10^{-1}$	5 CL=90%
	<i>D</i> , <i>D</i> *, or	D <sub>s</sub> modes		
$\Gamma_{13}$	$\overline{D}{}^0 \pi^+$	( 5.3 $\pm 0.5$	) × 10 <sup>-1</sup>	3
$\Gamma_{14}$	$\overline{D}{}^{0}\rho^{+}$	$(1.34\pm0.18)$	) %	
Γ <sub>15</sub>	$\overline{D}{}^0 \pi^+ \pi^+ \pi^-$	( $1.1~\pm0.4$	) %	
$\Gamma_{16}$	$\overline{D}{}^0\pi^+\pi^+\pi^-$ nonresonant	(5 ±4	) × 10 <sup>-1</sup>	3
Γ <sub>17</sub>	$\overline{D}{}^{0}\pi^{+}\rho^{0}$	( $4.2 \pm 3.0$	) × 10 <sup>-1</sup>	3
Γ <sub>18</sub>	$D^0 a_1(1260)^+$	(5 ±4	) × 10 <sup>-1</sup>	3
Γ <sub>19</sub>	$D^*(2010)^-\pi^+\pi^+$	( 2.1 $\pm 0.6$	) × 10 <sup>-1</sup>	3
Γ <sub>20</sub>	$D^-\pi^+\pi^+$	< 1.4	$\times 10^{-1}$	<sup>3</sup> CL=90%
Γ <sub>21</sub>	$D^*(2007)^0 \pi^+$	$(4.6 \pm 0.4)$	) × 10 <sup></sup>	3
I 22	$D^{*}(2010)^{+}\pi^{0}$	< 1.7	$\times 10^{-1}$	4 CL=90%
l 23	$D^{*}(2007)^{\circ}\rho^{+}$	$(1.55\pm0.31)$	)%	2
I <sub>24</sub>	$D^{*}(2007)^{\circ}\pi^{+}\pi^{+}\pi^{-}$	( 9.4 ±2.6	) × 10 <sup></sup>	3

Г <sub>25</sub> Г <sub>26</sub>	$\overline{D}^*(2007)^0 a_1(1260)^+$ $D^*(2010)^- \pi^+ \pi^+ \pi^0$	$(1.9 \pm 0.5)$ $(1.5 \pm 0.7)$	) % ) %	
Γ <sub>27</sub>	$D^*(2010)^- \pi^+ \pi^+ \pi^+ \pi^-$	< 1	%	CL=90%
I <sub>28</sub>	$D_1^*(2420)^0 \pi^+$	$(1.5 \pm 0.6)$	) × 10 <sup>-3</sup>	S=1.3
l <sub>29</sub>	$D_1^*(2420)^0 \rho^+$	< 1.4	$\times 10^{-3}$	CL=90%
Г <sub>30</sub>	$D_2^*(2460)^0 \pi^+$	< 1.3	$\times 10^{-3}$	CL=90%
Г <sub>31</sub>	$D_2^*(2460)^{\circ}\rho^+$	< 4.7	$\times 10^{-3}$	CL=90%
Г <sub>32</sub>	$\frac{D^0}{s} D_s^+$	( $1.3 \pm 0.4$	) %	
Г <sub>33</sub>	$\underline{D}^0 D_s^{*+}$	(9 ±4	$)  imes 10^{-3}$	
Г <sub>34</sub>	$\overline{D}^{*}(2007)^{0} D_{s}^{+}$	( 1.2 $\pm 0.5$	) %	
Γ <sub>35</sub>	$\overline{D}^{*}(2007)^{0} D_{s}^{*+}$	( $2.7~\pm1.0$	) %	
Г <sub>36</sub>	$D_s^+ \pi^0$	< 2.0	imes 10 <sup>-4</sup>	CL=90%
Г <sub>37</sub>	$D_s^{*+}\pi^0$	< 3.3	imes 10 <sup>-4</sup>	CL=90%
Г <sub>38</sub>	$D_s^+\eta$	< 5	imes 10 <sup>-4</sup>	CL=90%
Г <sub>39</sub>	$D_s^{*+}\eta$	< 8	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>40</sub>	$D_s^+ \rho^0$	< 4	imes 10 <sup>-4</sup>	CL=90%
$\Gamma_{41}$	$D_s^{*+} \rho^0$	< 5	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>42</sub>	$D_s^+ \omega$	< 5	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>43</sub>	$D_s^{*+}\omega$	< 7	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>44</sub>	$D_{s}^{+}a_{1}(1260)^{0}$	< 2.2	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>45</sub>	$D_{s}^{*+}a_{1}(1260)^{0}$	< 1.6	imes 10 <sup>-3</sup>	CL=90%
Г <sub>46</sub>	$D_{s}^{+}\phi$	< 3.2	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>47</sub>	$D_{s}^{*+}\phi$	< 4	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>48</sub>	$D_{S}^{+}\overline{K}^{0}$	< 1.1	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>49</sub>	$D_{s}^{*+}\overline{K}^{0}$	< 1.1	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>50</sub>	$D_{5}^{+}\overline{K}^{*}(892)^{0}$	< 5	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>51</sub>	$D_{s}^{*+}\overline{K}^{*}(892)^{0}$	< 4	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>52</sub>	$D_{s}^{-}\pi^{+}K^{+}$	< 8	imes 10 <sup>-4</sup>	CL=90%
Г <sub>53</sub>	$D_{s}^{\tilde{s}-}\pi^{+}K^{+}$	< 1.2	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>54</sub>	$D_{s}^{-}\pi^{+}K^{*}(892)^{+}$	< 6	imes 10 <sup>-3</sup>	CL=90%
Г <sub>55</sub>	$D_{s}^{*-}\pi^{+}K^{*}(892)^{+}$	< 8	imes 10 <sup>-3</sup>	CL=90%
	Charmonium r	nodes		
Γ <sub>56</sub>	$J/\psi(1S)K^+$	( 9.9 $\pm 1.0$	) × 10 <sup>-4</sup>	

' 50	$y \varphi(10) \pi$	$(5.5 \pm 1.0) \times 10$	
Γ <sub>57</sub>	$J/\psi(1S)K^+\pi^+\pi^-$	( 1.4 $\pm 0.6$ ) $ imes 10^{-3}$	
Γ <sub>58</sub>	$J/\psi(1S)K^{*}(892)^{+}$	$(1.47\pm0.27) imes10^{-3}$	
Γ <sub>59</sub>	$J/\psi(1S)\pi^+$	( 5.0 $\pm 1.5$ ) $ imes 10^{-5}$	
Г <sub>60</sub>	$J/\psi(1S) ho^+$	$< 7.7 \times 10^{-4}$	CL=90%

Г <sub>61</sub>	$J/\psi(1S)a_1(1260)^+$	< 1.2	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>62</sub>	$\psi(2S)K^+$	$(6.9 \pm 3.1)$	$)  imes 10^{-4}$	S=1.3
Γ <sub>63</sub>	$\psi(2S)K^*(892)^+$	< 3.0	$\times 10^{-3}$	CL=90%
Γ <sub>64</sub>	$\psi(2S)K^{+}\pi^{+}\pi^{-}$	( $1.9~\pm1.2$	$) \times 10^{-3}$	
Γ <sub>65</sub>	$\chi_{c1}(1P)K^+$	( 1.0 ±0.4	$) \times 10^{-3}$	
Г <sub>66</sub>	$\chi_{c1}(1P) K^*(892)^+$	< 2.1	× 10 <sup>-3</sup>	CL=90%
	Korl	K* modes		
Г <sub>67</sub>	$K^0 \pi^+$	( 2.3 ±1.1	$) \times 10^{-5}$	
Г <sub>68</sub>	$K^+ \pi^0$	< 1.6	$^{'} \times 10^{-5}$	CL=90%
Г <sub>69</sub>	$\eta' K^+$	( $6.5 \pm 1.7$	$) imes 10^{-5}$	
Γ <sub>70</sub>	$\eta' K^*(892)^+$	< 1.3	$\times 10^{-4}$	CL=90%
Γ <sub>71</sub>	$\eta K^+$	< 1.4	imes 10 <sup>-5</sup>	CL=90%
$\Gamma_{72}$	$\eta K^{*}(892)^{+}$	< 3.0	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>73</sub>	$K^{*}(892)^{0}\pi^{+}$	< 4.1	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>74</sub>	$K^{*}(892)^{+}\pi^{0}$	< 9.9	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>75</sub>	$K^+\pi^-\pi^+$ nonresonant	< 2.8	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>76</sub>	$K^{-}\pi^{+}\pi^{+}$ nonresonant	< 5.6	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>77</sub>	$K_1(1400)^0 \pi^+$	< 2.6	imes 10 <sup>-3</sup>	CL=90%
Г <sub>78</sub>	${ m K}_2^*(1430)^0\pi^+$	< 6.8	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>79</sub>	$K^+  ho^0$	< 1.9	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>80</sub>	$\kappa^0  ho^+$	< 4.8	imes 10 <sup>-5</sup>	CL=90%
Г <sub>81</sub>	$K^{*}(892)^{+}\pi^{+}\pi^{-}$	< 1.1	imes 10 <sup>-3</sup>	CL=90%
Г <sub>82</sub>	$K^{*}(892)^{+} \rho^{0}$	< 9.0	imes 10 <sup>-4</sup>	CL=90%
Г <sub>83</sub>	$K_1(1400)^+ \rho^0$	< 7.8	imes 10 <sup>-4</sup>	CL=90%
Г <sub>84</sub>	$K_2^*(1430)^+  ho^0$	< 1.5	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>85</sub>	$K^+\overline{K}^0$	< 2.1	imes 10 <sup>-5</sup>	CL=90%
Г <sub>86</sub>	${\it K}^+ {\it K}^- \pi^+$ nonresonant	< 7.5	imes 10 <sup>-5</sup>	CL=90%
Г <sub>87</sub>	$K^+ K^- K^+$	< 2.0	imes 10 <sup>-4</sup>	CL=90%
Г <sub>88</sub>	$\mathcal{K}^+ \phi$	< 1.2	imes 10 <sup>-5</sup>	CL=90%
Г <sub>89</sub>	$K^+K^-K^+$ nonresonant	< 3.8	imes 10 <sup>-5</sup>	CL=90%
Г <sub>90</sub>	$K^{*}(892)^{+}K^{+}K^{-}$	< 1.6	imes 10 <sup>-3</sup>	CL=90%
Г <sub>91</sub>	${\sf K}^*(892)^+\phi$	< 7.0	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>92</sub>	$K_1(1400)^+ \phi$	< 1.1	imes 10 <sup>-3</sup>	CL=90%
Г <sub>93</sub>	$K_2^*(1430)^+ \phi$	< 3.4	imes 10 <sup>-3</sup>	CL=90%
Г <sub>94</sub>	$K^{+} f_{0}(980)$	< 8	imes 10 <sup>-5</sup>	CL=90%
Г <sub>95</sub>	$\mathcal{K}^*(892)^+ \gamma$	( $5.7\pm 3.3$	$) \times 10^{-5}$	
Г <sub>96</sub>	$K_1(1270)^+\gamma$	< 7.3	imes 10 <sup>-3</sup>	CL=90%
Г <sub>97</sub>	$K_1(1400)^+\gamma$	< 2.2	imes 10 <sup>-3</sup>	CL=90%
Г <sub>98</sub>	$K_2^*(1430)^+ \gamma$	< 1.4	imes 10 <sup>-3</sup>	CL=90%
Г <sub>99</sub>	$K^*(1680)^+\gamma$	< 1.9	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>100</sub>	$K_{3}^{*}(1780)^{+}\gamma$	< 5.5	imes 10 <sup>-3</sup>	CL=90%
$\Gamma_{101}$	$K_{4}^{*}(2045)^{+}\gamma$	< 9.9	imes 10 <sup>-3</sup>	CL=90%

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Light	unflavored	meson	modes
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Γ <sub>102</sub>	$\pi^+\pi^0$	< 2	2.0	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>103</sub>	$\pi^+\pi^+\pi^-$	< 1	3	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>104</sub>	$ ho^{0}\pi^{+}$	< 4	.3	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>105</sub>	$\pi^+ f_0(980)$	< 1	4	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>106</sub>	$\pi^+ f_2(1270)$	< 2	2.4	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>107</sub>	$\pi^+\pi^-\pi^+$ nonresonant	< 4	.1	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>108</sub>	$\pi^+\pi^0\pi^0$	< 8	8.9	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>109</sub>	$ ho^+\pi^0$	< 7	'.7	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>110</sub>	$\pi^+\pi^-\pi^+\pi^0$	< 4	.0	imes 10 <sup>-3</sup>	CL=90%
Г <sub>111</sub>	$ ho^+ ho^0$	< 1	0	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>112</sub>	$a_1(1260)^+ \pi^0$	< 1	7	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>113</sub>	$a_1(1260)^0 \pi^+$	< 9	0.0	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>114</sub>	$\omega \pi^+$	< 4	.0	imes 10 <sup>-4</sup>	CL=90%
$\Gamma_{115}$	$\eta \pi^+$	< 1	5	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>116</sub>	$\eta'\pi^+$	< 3	8.1	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>117</sub>	$\eta' \rho_{\perp}^+$	< 4	.7	$\times 10^{-5}$	CL=90%
Γ <sub>118</sub>	$\eta \rho^+$	< 3	8.2	$\times 10^{-5}$	CL=90%
Γ <sub>119</sub>	$\pi^{+}\pi^{+}\pi^{+}\pi^{-}\pi^{-}$	< 8	8.6	$\times 10^{-4}$	CL=90%
Γ <sub>120</sub>	$\rho_{a1}^{0}(1260)^{+}$	< 6	5.2	$\times 10^{-4}$	CL=90%
$\Gamma_{121}$	$\rho^0 a_2(1320)^+$	< 7	.2	$\times 10^{-4}$	CL=90%
$\Gamma_{122}$	$\pi^{+}\pi^{+}\pi^{+}\pi^{-}\pi^{-}\pi^{0}$	< 6	i.3	$\times 10^{-3}$	CL=90%
Γ <sub>123</sub>	$a_1(1260)^+  a_1(1260)^0$	< 1	3	%	CL=90%
	Barvon m	odes			
Γ124	$p\overline{p}\pi^+$	< 1	6	$\times 10^{-4}$	CL=90%
$\Gamma_{125}$	$p \overline{p} \pi^+$ nonresonant	< 5	5.3	imes 10 <sup>-5</sup>	CL=90%
$\Gamma_{126}$	$p\overline{p}\pi^+\pi^+\pi^-$	< 5	5.2	$\times 10^{-4}$	CL=90%
Γ <sub>127</sub>	$p \overline{p} K^+$ nonresonant	< 8	8.9	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>128</sub>	$p\overline{\Lambda}$	< 6	5	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>129</sub>	$p\overline{\Lambda}\pi^+\pi^-$	< 2	2.0	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>130</sub>	$\overline{\Delta}^0 p$	< 3	8.8	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>131</sub>	$\Delta^{++}\overline{p}$	< 1	5	imes 10 <sup>-4</sup>	CL=90%
Γ <sub>132</sub>	$\Lambda_c^- p \pi^+$	(6	5.2 ±2.7 )	imes 10 <sup>-4</sup>	
Γ <sub>133</sub>	$\Lambda_c^{-} p \pi^+ \pi^0$	< 3	8.12	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>134</sub>	$\Lambda_c^- p \pi^+ \pi^+ \pi^-$	< 1	46	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>135</sub>	$\Lambda_c^{-} p \pi^+ \pi^+ \pi^- \pi^0$	< 1	34	%	CL=90%

	$\Delta B = 1$	weak neutral curre	ent ( <i>B1</i>	) modes	
Γ <sub>136</sub>	$\pi^+ e^+ e^-$	B1	< 3.9	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>137</sub>	$\pi^+ \mu^+ \mu^-$	B1	< 9.1	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>138</sub>	$K^{+}e^{+}e^{-}$	B1	< 6	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>139</sub>	$K^+ \mu^+ \mu^-$	B1	< 1.0	imes 10 <sup>-5</sup>	CL=90%
Γ <sub>140</sub>	K*(892) <sup>+</sup> e <sup>+</sup> e <sup>-</sup>	B1	< 6.9	imes 10 <sup>-4</sup>	CL=90%
$\Gamma_{141}$	$K^{*}(892)^{+}\mu^{+}\mu^{-}$	B1	< 1.2	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>142</sub>	$\pi^+ e^+ \mu^-$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>143</sub>	$\pi^+ e^- \mu^+$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>144</sub>	${\cal K}^+e^+\mu^-$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>145</sub>	${\cal K}^+e^-\mu^+$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>146</sub>	$\pi^- e^+ e^+$	L	< 3.9	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>147</sub>	$\pi^-\mu^+\mu^+$	L	< 9.1	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>148</sub>	$\pi^- e^+ \mu^+$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>149</sub>	$K^-e^+e^+$	L	< 3.9	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>150</sub>	$K^-\mu^+\mu^+$	L	< 9.1	imes 10 <sup>-3</sup>	CL=90%
Γ <sub>151</sub>	${\it K^-e^+\mu^+}$	LF	< 6.4	imes 10 <sup>-3</sup>	CL=90%

Lepton Family number (*LF*) or Lepton number (*L*) violating modes, or  $\Delta B = 1$  weak neutral current (*B1*) modes

[a] An  $\ell$  indicates an e or a  $\mu$  mode, not a sum over these modes.

## **B+** BRANCHING RATIOS

$\Gamma(\ell^+ \nu_\ell \text{ anything}) / \Gamma_{\text{total}}$						$\Gamma_1/\Gamma$		
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>				
$0.1025 \pm 0.0057 \pm 0.0065$	<sup>12</sup> ARTUSO	97	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$			
$\bullet \bullet \bullet$ We do not use the follow	ving data for average	s, fits	s, limits,	etc. • • •				
$0.101 \ \pm 0.018 \ \pm 0.015$	ATHANAS	94	CLE2	Sup. by Al	RTUSO	97		
<sup>12</sup> ARTUSO 97 uses partial branching ratio from BARIS	<sup>12</sup> ARTUSO 97 uses partial reconstruction of $B \rightarrow D^* \ell \nu_{\ell}$ and inclusive semileptonic branching ratio from BARISH 96B (0.1049 ± 0.0017 ± 0.0043).							
$\Gamma(\overline{D}^{0}\ell^{+}\nu_{\ell})/\Gamma_{\text{total}}$ $\Gamma_{2}/\Gamma$								
VALUE	DOCUMENT ID		TECN	COMMENT				
0.0186±0.0033 OUR AVERAG	E							
$0.0194 \!\pm\! 0.0015 \!\pm\! 0.0034$	<sup>13</sup> ATHANAS	97	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$			
$0.016\ \pm 0.006\ \pm 0.003$	<sup>14</sup> FULTON	91	CLEO	$e^+e^- \rightarrow$	$\Upsilon(4S)$			
<sup>13</sup> ATHANAS 97 uses missing energy and missing momentum to reconstruct neutrino. <sup>14</sup> FULTON 91 assumes equal production of $B^0\overline{B}^0$ and $B^+B^-$ at the $\Upsilon(4S)$ .								
$\Gamma(\overline{D}^*(2007)^0 \ell^+ \nu_\ell) / \Gamma_{\text{total}}$	$r e and \mu modes$					Г <sub>3</sub> /Г		

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.053 ±0.008 OUR AVER	AGE			
$0.0513 \!\pm\! 0.0054 \!\pm\! 0.0064$	302	<sup>15</sup> BARISH	95 CLE2	$e^+e^-  ightarrow ~\Upsilon(4S)$
$0.066\ \pm 0.016\ \pm 0.015$		<sup>16</sup> ALBRECHT	92c ARG	$e^+e^-  ightarrow ~\Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

seen39817 SANGHERA93CLE2 $e^+e^- \rightarrow \Upsilon(4S)$ 0.041 $\pm 0.008$  $\stackrel{+0.008}{-0.009}$ 18 FULTON91CLEO $e^+e^- \rightarrow \Upsilon(4S)$ 0.070 $\pm 0.018$  $\pm 0.014$ 19 ANTREASYAN 90BCBAL $e^+e^- \rightarrow \Upsilon(4S)$ 15 BARISH 95 use B( $D^0 \rightarrow K^-\pi^+$ ) $= (3.91 \pm 0.08 \pm 0.17)\%$  and B( $D^{*0} \rightarrow D^0\pi^0$ ) $= (63.6 \pm 2.3 \pm 3.3)\%$ .16 ALBRECHT 92C reports $0.058 \pm 0.014 \pm 0.013$ . We rescale using the method described in

STONE 94 but with the updated PDG 94 B( $D^0 \rightarrow K^- \pi^+$ ). Assumes equal production of  $B^0 \overline{B}{}^0$  and  $B^+ B^-$  at the  $\Upsilon(4S)$ .

<sup>17</sup> Combining  $\overline{D}^{*0}\ell^+\nu_{\ell}$  and  $\overline{D}^{*-}\ell^+\nu_{\ell}$  SANGHERA 93 test V-A structure and fit the decay angular distributions to obtain  $A_{FB} = 3/4*(\Gamma^- - \Gamma^+)/\Gamma = 0.14 \pm 0.06 \pm 0.03$ . Assuming a value of  $V_{cb}$ , they measure V,  $A_1$ , and  $A_2$ , the three form factors for the  $D^*\ell\nu_{\ell}$  decay, where results are slightly dependent on model assumptions.

<sup>18</sup> Assumes equal production of  $B^0 \overline{B}{}^0$  and  $B^+ B^-$  at the  $\Upsilon(4S)$ . Uncorrected for D and  $D^*$  branching ratio assumptions.

<sup>19</sup>ANTREASYAN 90B is average over B and  $\overline{D}^*(2010)$  charge states.

$\Gamma(\pi^0 e^+ \nu_e) / \Gamma_{\text{total}}$						Γ <sub>4</sub> /Γ
VALUE	CL%	DOCUMENT ID	TECN	<u>COMMENT</u>		
<0.0022	90	ANTREASYAN 90B	CBAL	$e^+e^- \rightarrow$	$\Upsilon(4S)$	
$\frac{\Gamma(\omega \ell^+ \nu_\ell)}{\ell = e \text{ or } \mu, \text{ not su}}$	um over e	e and $\mu$ modes.				Г <sub>5</sub> /Г

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<2.1 × 10 <sup>-4</sup>	90	<sup>20</sup> BEAN	93B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>20</sup> BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine  $\Gamma(\rho^0 \ell^+ \nu_\ell)$  and  $\Gamma(\rho^- \ell^+ \nu_\ell)$  with this result, they obtain a limit  $<(1.6-2.7) \times 10^{-4}$  at 90% CL for  $B^+ \to \omega \ell^+ \nu_\ell$ . The range corresponds to the ISGW, WSB, and KS models. An upper limit on  $|V_{ub}/V_{cb}| < 0.8$ -0.13 at 90% CL is derived as well.

$\Gamma(\omega \mu^+  u_\mu) / \Gamma_{\text{total}}$		Г <sub>6</sub> /Г
VALUE	DOCUMENT ID TECN	
$\bullet$ $\bullet$ $\bullet$ We do not use the fol	lowing data for averages, fits, limits, etc. $ullet$ $ullet$	•
seen	<sup>21</sup> ALBRECHT 91c ARG	
		6 . I I

<sup>21</sup> In ALBRECHT 91C, one event is fully reconstructed providing evidence for the  $b \rightarrow u$  transition.

## $\Gamma(\rho^0 \ell^+ \nu_\ell) / \Gamma_{\text{total}}$

$\ell = e \text{ or } \mu, \text{ not su}$	ım over	$r$ $e$ and $\mu$ modes.			• //•
VALUE	CL%	DOCUMENT ID	TECN	<u>COMMENT</u>	
<2.1 × 10 <sup>-4</sup>	90	<sup>22</sup> BEAN	93B CLE2	$e^+e^- \rightarrow \gamma(4S)$	)

<sup>22</sup> BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine  $\Gamma(\omega^0 \ell^+ \nu_\ell)$  and  $\Gamma(\rho^- \ell^+ \nu_\ell)$  with this result, they obtain a limit  $<(1.6-2.7) \times 10^{-4}$  at 90% CL for  $B^+ \rightarrow \rho^0 \ell^+ \nu_\ell$ . The range corresponds to the ISGW, WSB, and KS models. An upper limit on  $|V_{ub}/V_{cb}| < 0.8-0.13$  at 90% CL is derived as well.

HTTP://PDG.LBL.GOV

 $\Gamma_7/\Gamma$ 

$\Gamma(e^+\nu_e)/\Gamma_{\text{total}}$						Г8/Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<1.5 × 10 <sup>—5</sup>	90	ARTUSO	95	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$\Gamma(\mu^+ u_{\mu})/\Gamma_{ ext{total}}$						٦/و٦
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	<u>COMMENT</u>	
<2.1 × 10 <sup>=5</sup>	90	ARTUSO	95	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$\Gammaig( au^+ u_ auig)/\Gamma_{ ext{total}}$						Г <sub>10</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID		<u>TECN</u>	<u>COMMENT</u>	
<5.7 × 10 <sup>-4</sup>	90 fallouin	<sup>23</sup> ACCIARRI	97F	L3	$e^+e^- \rightarrow$	Ζ
• • • vve do not use the	e tollowin	g data for average	es, tits	, limits,		
$<1.04 \times 10^{-2}$	90	<sup>24</sup> ALBRECHT	<b>95</b> D	ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$<2.2 \times 10^{-3}$	90	ARTUSO	95	CLE2	$e^+e^- \rightarrow$	T(4S)
$<1.8 \times 10^{-3}$	90	<sup>25</sup> BUSKULIC	95	ALEP	$e^+e^- \rightarrow$	Ζ
<sup>24</sup> ALBRECHT 95D use <sup>25</sup> BUSKULIC 95 uses restricted to endpoin	e full reco same mis t region o	nstruction of one sing-energy techni of missing-energy	<i>B</i> dec ique a distrib	ay as ta s in <u>b</u> – oution.	$\stackrel{\text{ng.}}{\to} \tau^+ \nu_{\tau} X,$	but analysis is
$\Gamma(e^+ u_e\gamma)/\Gamma_{ ext{total}}$						$\Gamma_{11}/\Gamma$
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<2.0 × 10 <sup>-4</sup>	90	<sup>26</sup> BROWDER	97	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
energy and momentu	ım.	flicity of the CEE		etector 1	to reconstruc	
energy and momentum $\frac{\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{\text{total}}}{\frac{VALUE}{5}}$	ım. _ <u>CL%_</u> 	DOCUMENT ID	011 06	<u>TECN</u>	$\frac{COMMENT}{a^+a^-}$	$\Gamma_{12}/\Gamma$
energy and momentum $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{\text{total}}$ <u>VALUE</u> $< 5.2 \times 10^{-5}$ <sup>27</sup> BROWDER 97 uses energy and momentum	ım. _ <u>CL%</u> 90 the herm ım.	DOCUMENT ID 27 BROWDER iticity of the CLE	97 0 II de	<u>TECN</u> CLE2 etector 1	$\frac{COMMENT}{e^+e^-} \rightarrow$	$\Gamma_{12}/\Gamma$ $\Upsilon(4S)$
energy and momentum $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{\text{total}}$ <u>VALUE</u> $< 5.2 \times 10^{-5}$ <sup>27</sup> BROWDER 97 uses energy and momentum $\Gamma(\overline{D}^0 \pi^+) / \Gamma_{\text{total}}$	ım. _ <u>CL%</u> 90 the herm ım.	DOCUMENT ID 27 BROWDER iticity of the CLE	97 0 II de	<u>TECN</u> CLE2 etector 1	$\frac{COMMENT}{e^+e^-} \rightarrow$	$\Gamma_{12}/\Gamma$ $\tau(4S)$ ct the neutrino $\Gamma_{13}/\Gamma$
energy and momentum $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{\text{total}}$ <u>VALUE</u> $<5.2 \times 10^{-5}$ <sup>27</sup> BROWDER 97 uses energy and momentum $\Gamma(\overline{D}^0 \pi^+) / \Gamma_{\text{total}}$ <u>VALUE</u>	IM. <u>CL%</u> 90 the herm IM. <u>EVTS</u>	<u>DOCUMENT ID</u> 27 BROWDER iticity of the CLEO <u>DOCUMENT</u>	97 O II de	<u>TECN</u> CLE2 etector 1	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruction	$\Gamma_{12}/\Gamma$ $\Upsilon(4S)$ ct the neutrino $\Gamma_{13}/\Gamma$
energy and momentum $\Gamma(\mu^+\nu_{\mu}\gamma)/\Gamma_{\text{total}}$ $\xrightarrow{VALUE}$ <5.2 × 10 <sup>-5</sup> <sup>27</sup> BROWDER 97 uses energy and momentum $\Gamma(\overline{D}^0 \pi^+)/\Gamma_{\text{total}}$ VALUE 0.0053±0.0005 OUR AND 0.0055 + 0.0004 + 0.00055	ım. <u>- <i>CL%</i></u> 90 the herm ım. <u>- <i>EVTS</i></u> <b>/ERAGE</b> 204	DOCUMENT ID 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM	97 0 II de - ID	TECN CLE2 etector 1 <u>TEC</u>	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruction	$\frac{\Gamma_{12}}{\Gamma_{12}}$ $\frac{\gamma(4S)}{\Gamma_{13}}$ The neutrino $\frac{\Gamma_{13}}{\Gamma_{13}}$
energy and momentum $\Gamma(\mu^+\nu_{\mu}\gamma)/\Gamma_{total}$ $\xrightarrow{VALUE}$ <b>&lt;5.2</b> × 10 <sup>-5</sup> <sup>27</sup> BROWDER 97 uses energy and momentum $\Gamma(\overline{D^0}\pi^+)/\Gamma_{total}$ $\underbrace{VALUE}$ <b>0.0053±0.0005 OUR AN</b> 0.0055±0.0004±0.0005 0.0050±0.0007±0.0005	ım. 90 the herm ım. <u>EVTS</u> <b>/ERAGE</b> 304	<u>DOCUMENT ID</u> 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE	97 0    de	<u>TECN</u> CLE2 etector 1 <u>TEC</u> 94 CL	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruct $\frac{CN}{CN} = \frac{COMME}{e^+e^-}$	$\Gamma_{12}/\Gamma$ $\overline{\gamma(4S)}$ ct the neutrino $\Gamma_{13}/\Gamma$ $\xrightarrow{NT}$ $\rightarrow \gamma(4S)$ $\gamma(4S)$
energy and momentum $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{total}$ $\sqrt{ALUE}$ $<5.2 \times 10^{-5}$ $2^7$ BROWDER 97 uses energy and momentum $\Gamma(\overline{D}^0 \pi^+) / \Gamma_{total}$ $\sqrt{ALUE}$ $0.0053 \pm 0.0005$ OUR AN $0.0055 \pm 0.0004 \pm 0.0005$ $0.0050 \pm 0.0007 \pm 0.0006$ $0.0054 \pm 0.0018 \pm 0.0012$	um. 90 the herm um. <b><u>EVTS</u> <b>(ERAGE</b> 304 54</b>	<u>DOCUMENT ID</u> 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE	97 0 II da <u>- ID</u>	<u>TECN</u> CLE2 etector 1 <u>TEC</u> 94 CL	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruct $\frac{CN}{E2} = \frac{e^+e^-}{e^+e^-}$ E0 $e^+e^-$	$\Gamma_{12}/\Gamma$ $\tau(4S)$ The neutrino $\Gamma_{13}/\Gamma$ $T_{NT}$ $\rightarrow \tau(4S)$ $\tau(4S)$ $\tau(4S)$
energy and momenta $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{total}$ $\frac{VALUE}{<5.2 \times 10^{-5}}$ 27 BROWDER 97 uses energy and momenta $\Gamma(\overline{D^0} \pi^+) / \Gamma_{total}$ $\frac{VALUE}{0.0053 \pm 0.0005 \text{ OUR AN}}$ $0.0055 \pm 0.0004 \pm 0.0005$ $0.0050 \pm 0.0007 \pm 0.0006$ 0.0054 + 0.0018 + 0.0012 -0.0015 - 0.0009	Im. 90 the herm Im. <b>EVTS</b> <b>/ERAGE</b> 304 54	DOCUMENT ID 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE 30 BEBEK	97 0    de - <i>ID</i>	<u>TECN</u> CLE2 etector 1 <u>TEC</u> 94 CL 92 CL	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruct $\frac{CN}{E2} e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$	$\Gamma_{12}/\Gamma$ $\overline{\gamma(4S)}$ The neutrino $\Gamma_{13}/\Gamma$ $\overline{\Gamma_{13}/\Gamma}$ $\xrightarrow{\gamma(4S)}{\rightarrow \gamma(4S)}$ $\rightarrow \gamma(4S)$
energy and momenta $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{total}$ <u>VALUE</u> $<5.2 \times 10^{-5}$ <sup>27</sup> BROWDER 97 uses energy and momenta $\Gamma(\overline{D^0} \pi^+) / \Gamma_{total}$ <u>VALUE</u> $0.0053 \pm 0.0005$ OUR AN $0.0055 \pm 0.0004 \pm 0.0005$ $0.0050 \pm 0.0007 \pm 0.0006$ 0.0054 + 0.0018 + 0.0012 -0.0015 - 0.0009 ••• We do not use the	Im. 90 the herm Im. EVTS <b>/ERAGE</b> 304 54 14 e followin	DOCUMENT ID 27 BROWDER iticity of the CLE <u>DOCUMENT</u> 28 ALAM 29 BORTOLE 30 BEBEK g data for average	97 0 II de <u>- ID</u> ETTO	<u>TECN</u> CLE2 etector 1 94 CL 92 CL 87 CL	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruct $\frac{CN}{E2} = e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$ etc. •••	$\Gamma_{12}/\Gamma$ $\tau(4S)$ The neutrino $\Gamma_{13}/\Gamma$ $ \tau(4S)$ $\rightarrow \tau(4S)$ $\rightarrow \tau(4S)$
energy and momenta $\Gamma(\mu^+ \nu_{\mu} \gamma) / \Gamma_{total}$ $\sqrt{ALUE}$ $<5.2 \times 10^{-5}$ $2^7$ BROWDER 97 uses energy and momenta $\Gamma(\overline{D^0} \pi^+) / \Gamma_{total}$ $\sqrt{ALUE}$ $0.0053 \pm 0.0005$ OUR AN $0.0055 \pm 0.0004 \pm 0.0005$ $0.0050 \pm 0.0007 \pm 0.0006$ 0.0054 + 0.0018 + 0.0012 0.0054 + 0.0018 + 0.0012 $0.0054 \pm 0.0008 \pm 0.0006$	um. 90 the herm im. <b>EVTS</b> <b>/ERAGE</b> 304 54 14 e followin 12	DOCUMENT ID 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE 30 BEBEK g data for average	97 0 II da <u>- ID</u> =TTO es, fits IT	<u>TECN</u> CLE2 etector 1 94 CL 92 CL 87 CL 5, limits, 90J AR	$\frac{COMMENT}{e^+e^-} \rightarrow$ to reconstruct $\frac{CN}{E2} = e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$ etc. ••• G $e^+e^-$	$\Gamma_{12}/\Gamma$ $\overline{\Upsilon(4S)}$ The neutrino $\Gamma_{13}/\Gamma$ $\overline{\Gamma_{13}/\Gamma}$ $\xrightarrow{T}{}$ $\xrightarrow{T}$
energy and momentum $\Gamma(\mu^+\nu_{\mu}\gamma)/\Gamma_{total}$ $\sqrt{ALUE}$ $<5.2 \times 10^{-5}$ 27 BROWDER 97 uses energy and momentum $\Gamma(\overline{D^0}\pi^+)/\Gamma_{total}$ $\sqrt{ALUE}$ $0.0055 \pm 0.0005$ OUR AN $0.0055 \pm 0.0007 \pm 0.0006$ $0.0054 \pm 0.0015 - 0.0009$ $\bullet \bullet$ We do not use the $0.0020 \pm 0.0008 \pm 0.0006$ $0.0019 \pm 0.0010 \pm 0.0006$	ım. 90 the herm ım. <b>EVTS</b> <b>/ERAGE</b> 304 54 14 e followin 12 7	DOCUMENT ID 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE 30 BEBEK g data for average 29 ALBRECH 31 ALBRECH	97 0    da <u>- ID</u> ETTO es, fits IT	TECN           CLE2           etector 1           94           92           87           CLI           90J           88K	$\frac{COMMENT}{e^+e^-} \rightarrow \frac{COMMENT}{e^+e^-}$ to reconstruct $\frac{CN}{E2} = e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$ etc. ••• G $e^+e^-$ G $e^+e^-$	$\Gamma_{12}/\Gamma$ $\overline{\Upsilon(4S)}$ The neutrino $\Gamma_{13}/\Gamma$ $\overline{\Gamma_{13}/\Gamma}$ $\xrightarrow{T}$ $\rightarrow \Upsilon(4S)$ $\rightarrow \Upsilon(4S)$ $\rightarrow \Upsilon(4S)$ $\rightarrow \Upsilon(4S)$ $\rightarrow \Upsilon(4S)$
energy and momentum $\Gamma(\mu^+\nu_\mu\gamma)/\Gamma_{total}$ $\xrightarrow{VALUE}$ <b>5.2</b> × 10 <sup>-5</sup> <sup>27</sup> BROWDER 97 uses energy and momentum $\Gamma(\overline{D^0}\pi^+)/\Gamma_{total}$ $\xrightarrow{VALUE}$ 0.0053±0.0005 OUR AX 0.0055±0.0004±0.0005 0.0050±0.0007±0.0006 0.0054+0.0018+0.0012 -0.0015-0.0009 ••• We do not use the 0.0020±0.0008±0.0006 0.0019±0.0010±0.0006 28 ALAM 94 assume example to the total total to the total t	um. $- \frac{CL\%}{90}$ the herm im. <b>/ERAGE</b> 304 54 <b>/ERAGE</b> 304 54 14 e followin 12 7 qual produ $-\pi^+$ ) ar $+\pi^+\pi^-$ iction of $\mu$ s been u TTO 92. umes $B^0$	<u>DOCUMENT ID</u> 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 27 BROWDER iticity of the CLEO <u>DOCUMENT</u> 28 ALAM 29 BORTOLE 30 BEBEK g data for average 29 ALBRECH 31 ALBRECH uction of $B^+$ and ad the PDG 1992 E )/B( $D^0 \rightarrow K^- \tau$ $B^+$ and $B^0$ at the pdated in BERKE $\overline{B}^0: B^+ B^-$ ratio is	97 OII do r ID ETTO es, fits IT IT $B^0$ a $B(D^0 - \tau^+)$ $\approx \Upsilon(4.5)$ ELMAI as 45:55	$\frac{TECN}{CLE2}$ etector 1 $\frac{TEC}{94}$ $\frac{TEC}{94}$ $\frac{TEC}{94}$ $\frac{94}{CL}$ $\frac{94}{92}$ $\frac{1}{CL}$ $\frac{90}{87}$ $\frac{1}{CL}$ $\frac{90}{87}$ $\frac{1}{CL}$ $\frac{90}{87}$ $\frac{1}{CL}$ $\frac{90}{87}$ $\frac{1}{CL}$ $\frac{90}{87}$ $\frac{1}{CL}$ $\frac{91}{7}$ $\frac{1}{1}$	$\frac{COMMENT}{e^+e^-} \rightarrow \frac{COMMENT}{e^+e^-}$ to reconstruct $\frac{CN}{E2} = e^+e^-$ E0 $e^+e^-$ E0 $e^+e^-$ etc. ••• G $e^+e^-$ G $e^+e^-$ C (4S) and us $\pi^+\pi^0)/B(D)$ uses the Marener are same a rseded by AL	$\Gamma_{12}/\Gamma$ $T(4S)$ The neutrino $\Gamma_{13}/\Gamma$ $T_{13}/\Gamma$

$\frac{\Gamma(\overline{D}^{0}\rho^{+})}{\Gamma_{\text{total}}}$	Γ <sub>14</sub> /Γ
0.0134 $\pm$ 0.0018 OUR AVERAGE0.0135 $\pm$ 0.0012 $\pm$ 0.0015210.013 $\pm$ 0.004 $\pm$ 0.0041• • • We do not use the following	$\begin{array}{llllllllllllllllllllllllllllllllllll$
0.021 $\pm$ 0.008 $\pm$ 0.009 1 <sup>32</sup> ALAM 94 assume equal production of absolute B( $D^0 \rightarrow K^- \pi^+$ ) a and B( $D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$ <sup>33</sup> Assumes equal production of fractions for the <i>D</i> . <sup>34</sup> ALBRECHT 88K assumes <i>B</i>	1.0 <sup>34</sup> ALBRECHT 88K ARG $e^+e^- \rightarrow \Upsilon(4S)$ duction of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and use the CLEO II and the PDG 1992 B( $D^0 \rightarrow K^-\pi^+\pi^0$ )/B( $D^0 \rightarrow K^-\pi^+$ ) $E^-$ )/B( $D^0 \rightarrow K^-\pi^+$ ). $E^-B^+$ and $B^0$ at the $\Upsilon(4S)$ and uses the Mark III branching $0\overline{B}^0:B^+B^-$ ratio is 45:55.
$\Gamma(\overline{D}^{0}\pi^{+}\pi^{+}\pi^{-})/\Gamma_{\text{total}}$	Г <sub>15</sub> /Г
VALUE	DOCUMENT ID TECN COMMENT
$0.0115 \pm 0.0029 \pm 0.0021$	<sup>35</sup> BORTOLETTO92 CLEO $e^+e^-  ightarrow \Upsilon(4S)$
<sup>35</sup> BORTOLETTO 92 assumes Mark III branching fractions	; equal production of $B^+$ and $B^0$ at the $\varUpsilon(4S)$ and uses for the $D.$
$\Gamma(\overline{D}^0 \pi^+ \pi^+ \pi^- \text{ nonresonant})$	t)/Γ <sub>total</sub> Γ <sub>16</sub> /Γ DOCUMENT ID TECN COMMENT
0.0051±0.0034±0.0023	$36 \overline{{}_{ m BORTOLETTO92}} \overline{{}_{ m CLEO}} \overline{{}_{ m e^+e^-}  ightarrow {}_{ m \gamma(4S)}}$
<sup>36</sup> BORTOLETTO 92 assumes Mark III branching fractions	; equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and uses for the $D.$
$\Gamma(\overline{D}^0 \pi^+  ho^0) / \Gamma_{\text{total}}$	Γ <sub>17</sub> /Γ DOCUMENT ID TECN COMMENT
0.0042±0.0023±0.0020	$37 \overline{{}_{ m BORTOLETTO92}} \overline{{}_{ m CLEO}} \overline{{}_{ m e^+e^-} \rightarrow {}_{ m } \gamma(4S)}$
<sup>37</sup> BORTOLETTO 92 assumes Mark III branching fractions	; equal production of $B^+$ and $B^0$ at the $\varUpsilon(4S)$ and uses for the $D.$
$\Gamma(\overline{D}^0 a_1(1260)^+)/\Gamma_{\text{total}}$	Γ <sub>18</sub> /Γ DOCUMENT ID TECN COMMENT
0.0045±0.0019±0.0031	$^{38}$ BORTOLETTO92 CLEO $e^+e^- \rightarrow \ \Upsilon(4S)$
<sup>38</sup> BORTOLETTO 92 assumes Mark III branching fractions	; equal production of $B^+$ and $B^0$ at the $\varUpsilon(4S)$ and uses for the $D.$
$\Gamma(D^*(2010)^-\pi^+\pi^+)/\Gamma_{\text{tota}}$	I FI19/F
0.0021±0.0006 OUR AVERA	GE
$0.0019 \!\pm\! 0.0007 \!\pm\! 0.0003$	14 <sup>39</sup> ALAM 94 CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
$0.0026\!\pm\!0.0014\!\pm\!0.0007$	11 <sup>40</sup> ALBRECHT 90J ARG $e^+e^- \rightarrow \Upsilon(4S)$
$0.0024 \substack{+ 0.0017  +  0.0010 \\ - 0.0016  -  0.0006}$	3 <sup>41</sup> BEBEK 87 CLEO $e^+e^- \rightarrow \Upsilon(4S)$
$\bullet \bullet \bullet$ We do not use the followi	ng data for averages, fits, limits, etc. $\bullet$ $\bullet$ $\bullet$

<0.004 90 42 BORTOLETTO92 CLEO 
$$e^+e^- \rightarrow \Upsilon(4S)$$
  
0.005 ±0.002 ±0.003 7 43 ALBRECHT 87C ARG  $e^+e^- \rightarrow \Upsilon(4S)$ 

 $^{39}$ ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2010)^+ \to D^0 \pi^+)$  and absolute  $B(D^0 \to K^- \pi^+)$  and the PDG 1992  $B(D^0 \to K^- \pi^+ \pi^0)/B(D^0 \to K^- \pi^+)$  and  $B(D^0 \to K^- \pi^+ \pi^+ \pi^-)/B(D^0 \to K^- \pi^+)$ .

<sup>40</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses the Mark III branching fractions for the D.

- $^{41}$ BEBEK 87 value has been updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92.
- $^{42}$ BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the D and  $D^*(2010)$ . The authors also find the product branching fraction into  $D^{**}\pi$  followed by  $D^{**} \rightarrow D^*(2010)\pi$  to be  $0.0014 \substack{+0.0008 \\ -0.0006} \pm$

0.0003 where  $D^{**}$  represents all orbitally excited D mesons.

<sup>43</sup>ALBRECHT 87C use PDG 86 branching ratios for D and  $D^*(2010)$  and assume  $B(\Upsilon(4S) \rightarrow B^+B^-) = 55\%$  and  $B(\Upsilon(4S) \rightarrow B^0\overline{B}^0) = 45\%$ . Superseded by AL-BRECHT 90J.

$\Gamma(D^{-}\pi^{+}\pi^{+})/\Gamma_{total}$					Г <sub>20</sub> /Г
VALUE	<u>CL%</u> EVTS	DOCUMENT ID	)	TECN	COMMENT
<0.0014	90	<sup>44</sup> ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$\bullet$ $\bullet$ We do not use the following	owing data for a	overages, fits, limit	s, etc.	• • •	
<0.007	90	<sup>45</sup> BORTOLET	ГО92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$0.0025 \substack{+0.0041 + 0.0024 \\ -0.0023 - 0.0008}$	1	<sup>46</sup> BEBEK	87	CLEO	$e^+e^-  ightarrow \gamma_{(4S)}$

 $^{44}$  ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\varUpsilon(4S)$  and use the Mark III  $\mathsf{B}(D^+ \to K^- \pi^+ \pi^+).$ 

 $^{45}$ BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the D. The product branching fraction into  $D_0^*(2340)\pi$ followed by  $D^*_{
m O}(2340)$  ightarrow  $D\pi$  is < 0.005 at 90%CL and into  $D^*_{
m 2}(2460)$  followed by  $D_2^*(2460) \rightarrow D\pi$  is < 0.004 at 90%CL.

 $^{46}$ BEBEK 87 assume the  $\Upsilon(4S)$  decays 43% to  $B^0\overline{B}^0$ . B( $D^- o K^+\pi^-\pi^-)=(9.1\pm$  $1.3 \pm 0.4)\%$  is assumed.

Γ( <u>D</u> *(2007) <sup>0</sup> π	.+)/Γ <sub>total</sub>						$\Gamma_{21}/\Gamma$
VALUE	E	VTS	DOCUME	VT ID	TECN	COMMENT	
$0.0046 \pm 0.0004$	OUR AVER	AGE					
$0.00434 \pm 0.00047$	$2\pm 0.00018$		<sup>47</sup> BRAND	ENB 98	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$0.0052\ \pm 0.0007$	$\pm 0.0007$	71	<sup>48</sup> ALAM	94	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$0.0072\ \pm 0.0018$	$\pm 0.0016$		<sup>49</sup> BORTO	LETTO92	CLEO	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$0.0040\ \pm 0.0014$	$\pm 0.0012$	9	<sup>49</sup> ALBREC	CHT 90.	ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
$\bullet$ $\bullet$ $\bullet$ We do not	use the follow	ving da	ta for avera	ges, fits, li	mits, etc		
$0.0027 \pm 0.0044$			<sup>50</sup> BEBEK	87	CLEO	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>47</sup> BRANDENBURG 98 assume equal production of $B^+$ and $B^0$ at $\Upsilon(4S)$ and use the $D^*$ reconstruction technique. The first error is their experiment's error and the second error							
is the systema	atic error from	n the P	DG 96 value	e of B( $D^*$	$\rightarrow D\pi$ )		

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- <sup>48</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0\pi^0)$  and absolute  $B(D^0 \rightarrow K^-\pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^-\pi^+\pi^0)/B(D^0 \rightarrow K^-\pi^+)$  and  $B(D^0 \rightarrow K^-\pi^+\pi^+\pi^-)/B(D^0 \rightarrow K^-\pi^+)$ .
- <sup>49</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the D and  $D^*(2010)$ .
- <sup>50</sup> This is a derived branching ratio, using the inclusive pion spectrum and other two-body B decays. BEBEK 87 assume the  $\Upsilon(4S)$  decays 43% to  $B^0\overline{B}^0$ .

$\Gamma(D^*(2010)^+\pi^0)/\Gamma_{total}$							
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	<u>COMMENT</u>			
<0.00017	90	<sup>51</sup> BRANDENB 98	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$		
				•			

<sup>51</sup>BRANDENBURG 98 assume equal production of  $B^+$  and  $B^0$  at  $\Upsilon(4S)$  and use the  $D^*$  partial reconstruction technique. The first error is their experiment's error and the second error is the systematic error from the PDG 96 value of  $B(D^* \rightarrow D\pi)$ .

$\Gamma(\overline{D}^*(2007)^0 \rho^+) / \Gamma_{\text{total}} \qquad \Gamma_2$							
VALUE	<b>EVTS</b>	DOCUMENT ID	TECN	COMMENT			
$0.0155 \pm 0.0031$ OUR AVER	AGE						
$0.0168 \pm 0.0021 \pm 0.0028$	86	<sup>52</sup> ALAM	94 CLE2	$e^+e^-  ightarrow ~\Upsilon(4S)$			
$0.010\ \pm 0.006\ \pm 0.004$	7	<sup>53</sup> ALBRECHT	90j ARG	$e^+e^-  ightarrow ~\Upsilon(4S)$			

<sup>52</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0 \pi^0)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ . The nonresonant  $\pi^+ \pi^0$  contribution under the  $\rho^+$  is negligible.

<sup>53</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the D and  $D^*(2010)$ .

<sup>55</sup> The three pion mass is required to be between 1.0 and 1.6 GeV consistent with an  $a_1$  meson. (If this channel is dominated by  $a_1^+$ , the branching ratio for  $\overline{D}^{*0}a_1^+$  is twice that for  $\overline{D}^{*0}\pi^+\pi^+\pi^-$ .)

## $\Gamma(\overline{D}^{*}(2007)^{0} a_{1}(1260)^{+})/\Gamma_{total}$

#### VALUE

## 0.0188±0.0040±0.0034 56,57 ALAM

<sup>56</sup> ALAM 94 value is twice their  $\Gamma(\overline{D}^*(2007)^0 \pi^+ \pi^+ \pi^-)/\Gamma_{\text{total}}$  value based on their observation that the three pions are dominantly in the  $a_1(1260)$  mass range 1.0 to 1.6 GeV.

DOCUMENT ID TECN COMMENT

94 CLE2  $e^+e^- \rightarrow \Upsilon(4S)$ 

<sup>57</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0\pi^0)$  and absolute  $B(D^0 \rightarrow K^-\pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^-\pi^+\pi^0)/B(D^0 \rightarrow K^-\pi^+)$  and  $B(D^0 \rightarrow K^-\pi^+\pi^+\pi^-)/B(D^0 \rightarrow K^-\pi^+)$ .

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Γ<sub>25</sub>/Γ

$\Gamma(D^*(2010)^-\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi$	$(0)/\Gamma_{\text{total}}$	DOCUMENT		CN COMMENT	Г <sub>26</sub> /Г
0.0150+0.0070+0.0003	26	58 AI BRECH	<u></u> Τ 90ιΔΓ	$c_{\rm C}$ $e^+e^-$	$\Upsilon(4S)$
• • • We do not use the	following d	ata for average	s, fits, limits,	etc. ● ● ●	, (10)
$0.043 \ \pm 0.013 \ \pm 0.026$	24	<sup>59</sup> ALBRECH	T 87C AR	$G e^+e^- \rightarrow$	$\Upsilon(4S)$
58 ALBRECHT OUL report	+c 0 018 +	$0.007 \pm 0.005$ f	$\operatorname{For} R(D^*(201$	س <sup>0</sup> π <sup>+</sup>	(-) $(-)$
0.06. We rescale to ou Our first error is their from using our best va uses Mark III branching <sup>59</sup> ALBRECHT 87C use $B(\Upsilon(4S) \rightarrow B^+B^-)$ BRECHT 901.	ar best value experiment alue. Assuming fractions PDG 86 ) = 55% a	the B( $D^*(2010)^{\circ}$ and s error and connect of the $D$ . for the $D$ . branching rational B( $\Upsilon(4S)$ –	b) $D(D'(20))$ $+ \rightarrow D^0 \pi^+$ pur second en- action of $B^+$ os for $D$ and $\rightarrow B^0 \overline{B}^0$ =	$(5)^{-} = (68.3 \pm 1)^{-}$ for is the system and $B^{0}$ at the and $D^{*}(2010)$ at $(45\%)^{-}$ Superse	$(4) \times 10^{-2}$ . ematic error $\mathcal{T}(4S)$ and and assume eded by AL-
$\Gamma(D^*(2010)^-\pi^+\pi^+\pi^+\pi^-\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi^+\pi$	.+ <i>π</i> -)/Γ	tatal			Г27/Г
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	- 217 -
<0.01	90 60	ALBRECHT	90J ARG	$e^+e^-  ightarrow \gamma$	(45)
$^{60}$ Assumes equal product fractions for the <i>D</i> and	tion of $B^{-}$ d $D^{*}(2010)$	<sup>+</sup> and B <sup>0</sup> at t ).	he $arTau(4S)$ as	nd uses Mark I	II branching
$\Gamma(\overline{D}_1^*(2420)^0\pi^+)/\Gamma_{tot}$		DOCUMENT			Г <sub>28</sub> /Г
0.0015+0.0006 OUR AVE	RAGE F	rror includes sci	<u>ID</u> <u>TE</u> ale factor of	1.3.	
$\begin{array}{c} 0.0011 \pm 0.0005 \pm 0.0002 \\ 0.0025 \pm 0.0007 \pm 0.0006 \end{array}$	8	<sup>61</sup> ALAM <sup>62</sup> ALBRECH	94 CL T 94D AR	$\begin{array}{ccc} E2 & e^+e^- \rightarrow \\ C & e^+e^- \rightarrow \end{array}$	$\Upsilon(4S)$ $\Upsilon(4S)$
<sup>61</sup> ALAM 94 assume equ $B(D^*(2010)^+ \rightarrow D^0 \\ K^- \pi^+ \pi^0)/B(D^0 \rightarrow$ <sup>62</sup> ALBRECHT 94D assu CLEO II $B(D^*(2010)^- 67\%)$ .	al product $\pi^+$ ) and a $K^-\pi^+$ ) a me equal $H^+ \rightarrow D^0$	ion of $B^+$ and bsolute B( $D^0$ – nd assuming B( production of $E$ $\pi^+$ ) assuming	$B^{0}$ at the 7 → $K^{-}\pi^{+}$ ) a $D_{1}(2420)^{0}$ - $B^{+}$ and $B^{0}$ $B(D_{1}(2420))$	$\Gamma(4S)$ and use nd the PDG 19 $\rightarrow D^*(2010)^+ \gamma$ at the $\Upsilon(4S)$ $0 \rightarrow D^*(2010)^+$	the CLEO II 92 B( $D^0 \rightarrow \pi^-$ ) = 67%. and use the 0) <sup>+</sup> $\pi^-$ ) =
$\Gamma(\overline{D}_1^*(2420)^0 ho^+)/\Gamma_{ m tot}$	al				Г <sub>29</sub> /Г
VALUE	<u>CL%</u> 63	DOCUMENT ID		$\frac{COMMENT}{+ - \sim}$	
< <b>0.0014</b>	90 00		94 CLE2	$e \cdot e \rightarrow I$	(45)
<sup>03</sup> ALAM 94 assume equ B $(D^*(2010)^+ \rightarrow D^0)$	al product $\pi^+$ ) assur	ion of $B^+$ and ning $B(D_1(242))$	$B^0$ at the $D^0 \to D^*(2)$	$(4S) \text{ and use } = (2010)^+ \pi^-) = 0$	the CLEO II 67%.
$\Gamma(\overline{D}_2^*(2460)^0\pi^+)/\Gamma_{\text{tot}}$	tal		TECN	COMMENT	Г <sub>30</sub> /Г
	<u>00</u> 64			$\frac{COMMENT}{a^+a^-}$	(15)
• • • We do not use the	55 following d	ata for average	s, fits, limits.	etc. $\bullet \bullet \bullet$	(75)
<0.0028	an 65		04 CIF2	$a^+a^- \rightarrow \gamma$	(45)
<0.0023	90 66	ALBRECHT	94D ARG	$e^+e^- \rightarrow \gamma$	(+3)
<sup>64</sup> ALAM 94 assume equ B( $D^+ \rightarrow K^- \pi^+ \pi^+$	al product ) and B( <i>D</i>	ion of $B^+$ and $2^*(2460)^0 \rightarrow L^+$	$B^0$ at the $T^0$ $D^+\pi^-)=30$	(4 <i>S</i> ) and use 0%.	the Mark III

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<sup>65</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the Mark III  $B(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and  $B(D_2^*(2460)^0 \rightarrow D^*(2010)^+ \pi^-) = 20\%$ .

<sup>66</sup> ALBRECHT 94D assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II B( $D^*(2010)^+ \rightarrow D^0 \pi^+$ ) and B( $D^*_2(2460)^0 \rightarrow D^*(2010)^+ \pi^-$ ) = 30%.

$\Gamma(\overline{D}_{2}^{*}(2460)^{0}\rho^{+})/\Gamma_{\text{total}}$							/Г
VALUE	CL%	DOCUMENT ID		TECN	COMMENT		
<0.0047	90	<sup>67</sup> ALAM	94	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$	
< 0.005	90	<sup>68</sup> ALAM	94	CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$	
67			-0				

<sup>67</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the Mark III  $B(D^+ \rightarrow K^- \pi^+ \pi^+)$  and  $B(D_2^*(2460)^0 \rightarrow D^+ \pi^-) = 30\%$ .

<sup>68</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the Mark III  $B(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and  $B(D_2^*(2460)^0 \rightarrow D^*(2010)^+ \pi^-) = 20\%$ .

Γ(T	<sup>р</sup> D_s^+)/Г	total						[	Г <sub>32</sub> /Г
VALU	E	E	<u>VTS</u>	DOCUMENT ID		TECN	<u>COMMENT</u>		
0.01	$3 \pm 0.004$	OUR AV	ERAGE						
0.01	$22 \pm 0.0032$	$2^{+0.0029}_{-0.0030}$		<sup>69</sup> GIBAUT	96	CLE2	$e^+ e^- \rightarrow$	$\Upsilon(4S)$	
0.01	$3 \pm 0.009$	$\pm 0.004$		<sup>70</sup> ALBRECHT	<b>92</b> G	ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$	
0.01	$5\pm0.007$	$\pm 0.004$	5	<sup>71</sup> BORTOLETT	<sup>-</sup> O90	CLEO	$e^+e^- \rightarrow$	$\Upsilon(4S)$	
69 (	GIBAUT 96	õ reports 0	.0126 $\pm$	$0.0022\pm0.0025$	for B(	$D_{s}^{+} \rightarrow$	$\phi \pi^+$ ) = 0.0	)35. We	rescale
t 70	o our bes xperiment ALBRECH	t value B( 's error and T 92G rep	$D_s^+ \rightarrow d \text{ our sec}$	$\phi\pi^+$ ) = (3.6 cond error is the s 24 $\pm$ 0.012 $\pm$ 0.4	± 0.9) ystem 004 fo	) $\times$ 10 <sup>-</sup> atic erro or B( $D_s^+$	$e^2$ . Our first r from using $e^-  ightarrow \phi \pi^+$ )	t error i our best = 0.02	s their value. 7. We
rescale to our best value $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 $D^0$ branching ratios, e.g., $B(D^0 \rightarrow K^- \pi^+) = 3.71 \pm 0.25\%$ .									
11	BORTOLE	TTO 90 re	ports 0.	$029\pm0.013$ for B	$(D_s^+$ -	$\rightarrow \phi \pi^+$	) = 0.02. W	e rescale	to our
ł	est value	$B(D_{s}^{+} \rightarrow$	$\phi \pi^+$ )	$=(3.6\pm0.9) imes1$	0 <sup>-2</sup> .	Our firs	t error is the	eir experi	ment's
e	rror and o	ur second	error is	the systematic er	ror fro	m using	our best va	lue.	

$\left( D^{\circ} D_{s}^{+} \right) / \left  total \right $			33/
VALUE	DOCUMENT ID	TECN	COMMENT
$0.009 \pm 0.004$ OUR AVERAGE			
$0.0084 \!\pm\! 0.0031 \!+\! 0.0020 \\ -\! 0.0021$	<sup>72</sup> GIBAUT	96 CLE2	$e^+e^-  ightarrow ~ \Upsilon(4S)$
$0.012 \pm 0.009 \pm 0.003$	73 ALBRECHT	92g ARG	$e^+e^-  ightarrow ~\Upsilon(4S)$
$^{72}\mathrm{GIBAUT}$ 96 reports 0.0087 $\pm$	$0.0027\pm0.0017$ for I	$B(D_s^+ \to q)$	$(\phi \pi^+) = 0.035$ . We rescale
to our best value $B(D_s^+ \rightarrow experiment's error and our sec 73 ALBRECHT 92G reports 0.02 rescale to our best value B(D)experiment's error and our secAssumes PDG 1990 D^0 brance$	$\phi \pi^+$ ) = (3.6 ± 0 cond error is the system $16 \pm 0.012 \pm 0.003$ $\frac{+}{s} \rightarrow \phi \pi^+$ ) = (3.6 size cond error is the system ching ratios, e.g., B( $I$	$(0.9) \times 10^{-2}$ $(0.9) \times 10^{-2}$ for $B(D_s^+$ $(0.9) \times 10^{-2}$ $(0.9) \times 10^{-2}$ $(0.9) \times 10^{-2}$ $(0.9) \times 10^{-2}$	2. Our first error is their from using our best value. $\rightarrow \phi \pi^+$ ) = 0.027. We <sup>-2</sup> . Our first error is their from using our best value. $\pi^+$ ) = 3.71 ± 0.25%.

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Review of nal C3, 1 (1998)

Particle Physics: C. C	aso <i>et al.</i> (Particle Data Group), European Physical Jou	irr
$\Gamma(\overline{D}^*(2007)^0 D_s^+)/\Gamma_{ta}$	tal Г <sub>34</sub> /Г	
VALUE	DOCUMENT ID TECN COMMENT	
$0.012 \pm 0.005$ OUR AVER		
$\begin{array}{c} 0.014 \pm 0.005 \pm 0.003 \\ 0.010 \pm 0.007 \pm 0.002 \end{array}$	$7^4$ GIBAUT 96 CLE2 $e^+e^-  ightarrow  au(4S)$ $7^5$ ALBRECHT 92G ARG $e^+e^-  ightarrow  au(4S)$	
<sup>74</sup> GIBAUT 96 reports 0.	$(140 \pm 0.0043 \pm 0.0035 \text{ for B}(D_c^+ \rightarrow \phi \pi^+) = 0.035. \text{ We rescale})$	
to our best value B( experiment's error and <sup>75</sup> ALBRECHT 92G repo	$D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their our second error is the systematic error from using our best value. Its $0.013 \pm 0.009 \pm 0.002$ for $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ . We	
rescale to our best valex experiment's error and Assumes PDG 1990 $\lambda$ 3.71 $\pm$ 0.25% and B(	The B( $D_s^+ \rightarrow \phi \pi^+$ ) = (3.6 ± 0.9) × 10 <sup>-2</sup> . Our first error is their our second error is the systematic error from using our best value. $D^0$ and $D^*(2007)^0$ branching ratios, e.g., B( $D^0 \rightarrow K^- \pi^+$ ) = $D^*(2007)^0 \rightarrow D^0 \pi^0$ ) = 55 ± 6%.	
$\Gamma(\overline{D}^{*}(2007)^{0}D_{c}^{*+})/\Gamma$	otal Γ <sub>35</sub> /Γ	
VALUE		
$0.027\pm0.010$ OUR AVER	NGE T	
$0.030\!\pm\!0.011\!\pm\!0.007$	76 GIBAUT 96 CLE2 $e^+e^- \rightarrow \Upsilon(4S)$	
$0.023\!\pm\!0.013\!\pm\!0.006$	$\gamma \gamma$ ALBRECHT 92G ARG $e^+e^-  ightarrow  \Upsilon(4S)$	
<sup>76</sup> GIBAUT 96 reports 0.	0.00000000000000000000000000000000000	
to our best value B( experiment's error and <sup>77</sup> ALBRECHT 92G repo rescale to our best val experiment's error and	$D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their our second error is the systematic error from using our best value. Its $0.031 \pm 0.016 \pm 0.005$ for $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ . We are $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their our second error is the systematic error from using our best value.	
Assumes PDG 1990 $I$ 3.71 $\pm$ 0.25% and B(	$D^*(2007)^0 \rightarrow D^0 \pi^0 = 55 \pm 6\%.$	
$\Gamma(D_s^+\pi^0)/\Gamma_{\text{total}}$	Г <sub>36</sub> /Г	
<u>VALUE</u>	$\frac{12\%}{78} = \frac{1}{78} \frac{1}{10} = \frac{1}{10} \frac{1}$	
	Alexander 95B Clez $e^+e^- \rightarrow T(45)$	
<sup>70</sup> ALEXANDER 93B rej	orts $< 2.0 \times 10^{-4}$ for B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.037. We rescale to	
our best value B( $D_s^+$	$\rightarrow \phi \pi^+) = 0.036.$	
$[\Gamma(D^{+}\pi^{0}) + \Gamma(D^{*+}\pi^{0})]$	0)]/Γ <sub>τατα</sub> (Γ <sub>26</sub> +Γ <sub>27</sub> )/Γ	
L' ( S '' ) '' ( S ' VALUE	(-30 + 37)/ · CL% DOCUMENT ID TECN COMMENT	
<0.0007	$\frac{79}{\text{ALBRECHT}} \xrightarrow{93} \text{ARG} \xrightarrow{e^+e^-} \xrightarrow{\gamma(4S)}$	
	(-2) = (-2) +	

<sup>9</sup>ALBRECHT 93E reports  $< 0.9 \times 10^{-3}$  for B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.027. We rescale to our best value B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.036.

$\Gamma(D_{s}^{*+}\pi^{0})/\Gamma_{ ext{total}}$					Г <sub>37</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<0.00033	90	<sup>80</sup> ALEXANDER	93B CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>80</sup> ALEXANDER 93B re	eports <	$< 3.2  imes 10^{-4}$ for B(	$D_s^+ \rightarrow \phi \pi^+$	) = 0.037.	We rescale to
our best value B( $D_s^+$	$ \rightarrow \phi$	$\pi^+$ ) = 0.036.			

	-						507
ALUE	<u> </u>	81	DOCUMENT ID		<u>CN</u>	<u>COMMENT</u>	20(4.6)
81 ALEXANDED 60	90			938 CL	E2	$e \cdot e \rightarrow$	1 (45)
<sup>o</sup> ALEXANDER 93B	reports <	< 4.6	$\times 10^{-4}$ for B(	$D_{s}^{+} \rightarrow$	$\phi \pi^{-}$	) = 0.037.	We rescale to
our best value B(D	$s \rightarrow \phi$	π⊤)	= 0.036.				
$\left(D_{c}^{*+}\eta\right)/\Gamma_{\text{total}}$							Г39/Г
VALUE	CL%		DOCUMENT ID	TE	CN	<u>COMMENT</u>	0,
<0.0008	90	82	ALEXANDER	93B CL	E2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>82</sup> ALEXANDER 93B	reports <	< 7.5	imes 10 <sup>-4</sup> for B(	$D_{c}^{+} \rightarrow$	$\phi \pi^+$	= 0.037.	We rescale to
our best value B( <i>D</i>	$s^+ \rightarrow \phi$	π <sup>+</sup> )	= 0.036.	5			
$\Gamma(D_s^+ \rho^0) / \Gamma_{\text{total}}$	<u>CLN</u>			TE	<u>cu</u>	COMMENT	Г <sub>40</sub> /Г
<0 0004	<u> </u>	83				$\frac{COMMENT}{a+a-}$	$\Upsilon(AC)$
83 ALEXANDED 00-	90		ALEXANDER	938 CL		$e e \rightarrow$	1 (45)
S ALEXANDER 93B	reports <	< 3.7	× 10 <sup>-+</sup> for B(	$D_{s}^{+} \rightarrow$	$\phi\pi$ '	) = 0.037.	We rescale to
our best value B( <i>D</i>	$s \rightarrow \phi$	π+)	= 0.036.				
$\left[\Gamma(D_{+}^{+}\rho^{0})+\Gamma(D_{+}^{+})\right]$	<del>K</del> *(892	2) <sup>0</sup> )	/Γ <sub>total</sub>			(	ʹΓ₄₀+Γ₅₀)/Γ
VALUE	<u>CL%</u>	, ,	DOCUMENT ID	TE	CN	COMMENT	
<0.0025	90	84	ALBRECHT	93e AR	G	$e^+e^- \rightarrow$	$\Upsilon(4S)$
							· · ·
<sup>84</sup> ALBRECHT 93E re	ports $< 3$	3.4  imes	$10^{-3}$ for B( $D_{c}^{+}$	$\to \phi \pi$	+)=	= 0.027. We	e rescale to ou
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ -$	ports < 3 $\rightarrow \phi \pi^+$ )	3.4 × = 0	$10^{-3}$ for B( $D_s^+$ .036.	$\to \phi \pi$	+)=	= 0.027. We	e rescale to ou
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+} \rho^0) / \Gamma_{total})$	ports < 3 $\rightarrow \phi \pi^+$ )	3.4 × = 0	$10^{-3}$ for B( $D_s^+$ .036.	$\rightarrow \phi \pi$	+)=	= 0.027. We	e rescale to ou Γ <sub>41</sub> /Γ
<sup>84</sup> ALBRECHT 93E re best value B( $D_s^+$ – $(D_s^{*+} ρ^0)/\Gamma_{total}$ /ALUE	ports < 3 $\rightarrow \phi \pi^+$ )	3.4 × = 0	$10^{-3}$ for B( $D_s^+$ .036.	$\dot{f} \rightarrow \phi \pi^{2}$	+)= 	= 0.027. We	e rescale to ou Γ <sub>41</sub> /Ι
<ul> <li><sup>84</sup> ALBRECHT 93E re best value B(D<sup>+</sup><sub>s</sub> - C(D<sup>*+</sup><sub>s</sub> ρ<sup>0</sup>)/Γ<sub>total</sub></li> <li>7(D<sup>*+</sup><sub>s</sub> ρ<sup>0</sup>)/Γ<sub>total</sub></li> <li>&lt;0.0005</li> </ul>	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90	3.4 × = 0 85	$10^{-3}$ for B( $D_s^+$ .036. <u>DOCUMENT ID</u> ALEXANDER	$\dot{f} \rightarrow \phi \pi$	+) = <u>CN</u> E2	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$	rescale to ou $\Gamma_{41}/\Gamma$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports <	3.4 × = 0 85 < 4.8	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B(	$T \rightarrow \phi \pi^{-1}$ $\frac{TE}{93B} CL$ $D_{c}^{+} \rightarrow$	+) = <u>CN</u> E2 φπ <sup>+</sup>	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.037.$	e rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <u>VALUE</u> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D)$	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ \rightarrow \phi$	3.4  imes = 0 85  imes 4.8 $\pi^+)$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036.	$T \rightarrow \phi \pi$ $\frac{TE}{93B \text{ CL}}$ $D_s^+ \rightarrow$	+) = <u>CN</u> E2 φπ <sup>+</sup>	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.037.$	rescale to our $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0))/\Gamma_{total}$ <u>VALUE</u> <0.0005 <sup>85</sup> ALEXANDER 93B our best value $B(D)$	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ s \phi \gamma$	$3.4 \times = 0$ $85 < 4.8 = \pi^+$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036.	$T \rightarrow \phi \pi^{-1}$ $\frac{TE}{93B \text{ CL}}$ $D_{s}^{+} \rightarrow$	$^+) =$ $\frac{CN}{E2}$ $\phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.037.$	rescale to our $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - (D_s^{*+} \rho^0) / \Gamma_{total})$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B our best value $B(D)$ $\Gamma(D_s^{*+} \rho^0) + \Gamma(D_s^{*+})$	ports < 3 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ reports < $\frac{+}{s} \rightarrow \phi^{2}$ $+ \mathbf{K} * (8)$	3.4 × = 0 85 < 4.8 π <sup>+</sup> ) <b>92)<sup>(</sup></b>	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. )]/ <b>\[</b> total]	$T \rightarrow \phi \pi^{-1}$ $\frac{TE}{93B} CL$ $D_{s}^{+} \rightarrow$	$(+) = \frac{cN}{E2}$ $\phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.037.$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - (D_s^{*+} \rho^0))/\Gamma_{total}$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B our best value $B(D)$ $\Gamma(D_s^{*+} \rho^0) + \Gamma(D_s^{*})$ (ALUE (0.0015)	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ s \rightarrow \phi$ ? + K * (8) <u>CL%</u> 00	3.4 × = 0 85 < 4.8 π <sup>+</sup> ) <b>92)<sup>0</sup></b> 86	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. DOCUMENT ID ALEDECHT	$ \xrightarrow{TE} \phi \pi^{-} \qquad \qquad$	(+) = E2 $\phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow (0.037)$ $= 0.037.$ $(0.000)$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - (D_s^{*+} \rho^0) / \Gamma_{total})$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B our best value $B(D)$ $[\Gamma(D_s^{*+} \rho^0) + \Gamma(D_s^{*+})]$ (ALUE (0.0015) 86 ALEXENT 025	ports < 3 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ reports < $\frac{+}{s} \rightarrow \phi^{2}$ $\frac{+}{K} \times (8)$ $- \frac{CL\%}{90}$	$3.4 \times = 0$ $85 \times 4.8$ $\pi^+$ ) <b>92)</b> $86 \times 20$	$10^{-3}$ for B( $D_s^+$ .036. ALEXANDER × $10^{-4}$ for B( = 0.036. <b>))/<math>\Gamma_{total}</math> <u>DOCUMENT ID</u> ALBRECHT</b>	$T \rightarrow \phi \pi^{-1}$ $\frac{TE}{93B} \text{ CL}$ $D_{s}^{+} \rightarrow$ $\frac{TE}{93E} \text{ AR}$	$\frac{CN}{E2} \phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.037.$ ( $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.027. We$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - (D_s^{*+} \rho^0) / \Gamma_{total})$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B our best value $B(D)$ ( $\Gamma(D_s^{*+} \rho^0) + \Gamma(D_s^{*+})$ ) (ALUE (0.0015) <sup>86</sup> ALBRECHT 93E re	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ \rightarrow \phi$ ? $+ \mathbf{K} * (8)$ <u>90</u> ports < 2 $- \frac{CL\%}{90}$	$3.4 \times = 0$ 85 $(4.8, \pi^+)$ $(92)^{0}$ 86 $2.0 \times 2$	$10^{-3}$ for B( $D_s^+$ .036. ALEXANDER × $10^{-4}$ for B( = 0.036. <b>P)]/</b> $\Gamma_{total}$ <u>DOCUMENT ID</u> ALBRECHT $10^{-3}$ for B( $D_s^+$	$ \begin{array}{c} \xrightarrow{TE} \\ 93B \\ D_{s}^{+} \rightarrow \end{array} \\ \hline 93E \\ \hline 93E \\ AR \\ \hline 93E \\ AR \\ \hline \rightarrow \phi \pi^{-} \end{array} $	$\frac{CN}{E2} \phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.037.$ $($ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ rescale to ou
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - (D_s^{*+} \rho^0) / \Gamma_{total})$ (ALUE (0.0005) <sup>85</sup> ALEXANDER 93B our best value $B(D)$ ( $\Gamma(D_s^{*+} \rho^0) + \Gamma(D_s^{*+})$ (ALUE (0.0015) <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - S^+)$	ports < 3 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ reports < $\frac{+}{s} \rightarrow \phi^{2}$ $\frac{+}{k} \overline{k} * (8)$ $- \frac{CL\%}{90}$ ports < 2 $\rightarrow \phi \pi^+$ )	$3.4 \times = 0$ 85 $(4.8)^{-1} \times (-1)^{-1} \times (-1)^{-1$	$10^{-3}$ for B( $D_s^+$ .036. ALEXANDER × $10^{-4}$ for B( = 0.036. <b>)))/<math>\Gamma_{total}</math> <u>DOCUMENT ID</u> ALBRECHT <math>10^{-3}</math> for B(<math>D_s^+</math> .036.</b>	$ \begin{array}{c} \rightarrow & \phi \pi^{-} \\ \hline 93B \text{ CL} \\ D_{s}^{+} \rightarrow \\ \hline 93E \text{ AR} \\ \hline 93E \text{ AR} \\ \hline \rightarrow & \phi \pi^{-} \end{array} $	$(+) = \frac{CN}{E2}$ $\phi \pi^+$ $(+) = \frac{CN}{E}$	$= 0.027. We$ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.037.$ $($ $\frac{COMMENT}{e^+e^-} \rightarrow$ $= 0.027. We$	e rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Upsilon(4S)$ $\Upsilon(4S)$ e rescale to ou
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $[\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^*)$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $\frac{+}{s} \rightarrow \phi^2$ $\frac{+}{k} \mathbf{K} * (8)$ <u>90</u> ports < 2 $\rightarrow \phi \pi^+$ )	$3.4 \times = 0$ 85 $(4.8, \pi^+)$ $(92)^{0}$ 866 $2.0 \times = 0$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. <b>DOCUMENT ID</b> ALBRECHT $10^{-3}$ for B( $D_s^+$ .036.	$ \begin{array}{c} \rightarrow & \phi \pi \\ \hline 93B \\ D_{s}^{+} \rightarrow \\ \hline 93E \\ \hline 93E \\ AR \\ \hline \rightarrow & \phi \pi \\ \end{array} $	$(+) = \frac{CN}{E2}$ $\phi \pi^+$ $(+) = \frac{CN}{E}$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.037.$ ( $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$	e rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ e rescale to ou $\Gamma_{42}/\Gamma$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $[\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^*)$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$ VALUE	ports < 3 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ reports < $+ \rightarrow \phi$ ? $+ \mathbf{K} * (8)$ $- \frac{CL\%}{90}$ ports < 2 $\rightarrow \phi \pi^+$ ) - CL%	$3.4 \times = 0$ $85 \times 4.8 \times 10^{-5}$ $(5.0 \times 10^{-5})^{-1}$ $(5.0 \times 10^{-5})^{-1})^{-1}$ $(5.0 \times 10^{$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. DOCUMENT ID ALBRECHT $10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID	$ \begin{array}{c} \rightarrow & \phi \pi \\ \hline 93B \text{ CL} \\ D_s^+ \rightarrow \\ \hline 93E \text{ AR} \\ \hline 93E \text{ AR} \\ \hline \rightarrow & \phi \pi \\ \hline \end{array} $	$(+) = \frac{CN}{E2}$ $(+) = \frac{CN}{CN}$ (+) = CN	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $COMMENT$	e rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Upsilon(4S)$ e rescale to ou $\Gamma_{42}/\Gamma$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $[\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^*)$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b>	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $\frac{+}{s} \rightarrow \phi^2$ $\frac{+}{s} \mathbf{K} * (8)$ <u>90</u> ports < 2 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90	$3.4 \times = 0$ $85 \times 4.8 \times 10^{-5}$ $\pi^{+}$ ) $92)^{0}$ $860 \times 10^{-5}$ = 0 $870 \times 10^{-5}$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. ))/ $\Gamma_{total}$ DOCUMENT ID ALBRECHT $10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER	$\begin{array}{c} \xrightarrow{T \in \Phi} & \phi \pi \end{array}$ $\begin{array}{c} \xrightarrow{T \in \Phi} \\ 93B \ CL \\ D_{s}^{+} \rightarrow \end{array}$ $\begin{array}{c} \xrightarrow{T \in \Phi} \\ 93E \ AR \\ \xrightarrow{T \to \Phi} & \phi \pi \end{array}$ $\begin{array}{c} \xrightarrow{T \in \Phi} \\ 93B \ CL \end{array}$	$(F_{1}) = \frac{CN}{E2}$ $(F_{2}) = \frac{CN}{E2}$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.037. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ rescale to ou $\Gamma_{42}/\Gamma$ $\Upsilon(4S)$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^{*})$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> • • We do not use the set of the set o	ports < 3 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ reports < $+ \rightarrow \phi$ ? $+ \mathbf{K} * (8)$ $- \frac{CL\%}{90}$ ports < 2 $\rightarrow \phi \pi^+$ ) $- \frac{CL\%}{90}$ he following	$3.4 \times = 0$ $85 \times 10^{-5} \times 10^{-5$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. DOCUMENT ID ALBRECHT $10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER ata for averages	$\begin{array}{c} \xrightarrow{T \in \phi} & \phi \pi \\ \hline & 93B \ CL \\ D_{s}^{+} \rightarrow \\ \hline & 93E \ AR \\ \hline & \phi \pi \\ \hline & 93B \ CL \\ \hline & 93B \ CL \\ \hline & s, \ fits, \ lin \end{array}$	$\frac{CN}{E2} \phi \pi^+$ $\frac{CN}{G} \phi \pi^+$ $\frac{CN}{E2} \phi \pi^+$ $\frac{CN}{E2} \phi \pi^+$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ rescale to ou $\Gamma_{42}/\Gamma$ $\Upsilon(4S)$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $[\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^*)$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> • We do not use th <0.0025	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ \rightarrow \phi$ ? $+ \overleftarrow{K} * (8)$ <u>90</u> ports < 2 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 he following 90	$3.4 \times = 0$ $85 \times 4.8 \times 10^{-5}$ $(\pi^+)$ $(92)^{0}$ $860 \times 10^{-5}$ = 0 $870 \times 10^{-5}$ $870 \times 10^$	$10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER $\times 10^{-4}$ for B( = 0.036. ))/ $\Gamma_{total}$ DOCUMENT ID ALBRECHT $10^{-3}$ for B( $D_s^+$ .036. DOCUMENT ID ALEXANDER ata for averages ALBRECHT	$\begin{array}{c} \rightarrow & \phi \pi \\ \hline 93B \ CL \\ D_{s}^{+} \rightarrow \\ \hline 93E \ AR \\ \hline 93E \ AR \\ \hline 93B \ CL \\ \hline 93B \ CL \\ \hline 93B \ CL \\ \hline s, \ fits, \ lin \\ 93E \ AR \end{array}$	$(F_{1}) = \frac{CN}{E2}$ $(F_{2}) = \frac{CN}{E2}$ $(F_{2}) = \frac{CN}{E2}$ $(F_{2}) = \frac{CN}{E2}$ $(F_{2}) = \frac{CN}{E2}$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. = 0.027. We$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ rescale to ou $\Gamma_{42}/\Gamma$ $\Upsilon(4S)$ $\Upsilon(4S)$
<sup>84</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^{*+}\rho^0)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> <sup>85</sup> ALEXANDER 93B our best value $B(D$ $\Gamma(D_s^{*+}\rho^0) + \Gamma(D_s^*)$ <del>VALUE</del> <b>&lt;0.0015</b> <sup>86</sup> ALBRECHT 93E re best value $B(D_s^+ - \Gamma(D_s^+\omega)/\Gamma_{total})$ <del>VALUE</del> <b>&lt;0.0005</b> ••• We do not use th <b>&lt;0.0025</b> <sup>87</sup> ALEXANDER 93B	ports < 3 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 reports < $+ \rightarrow \phi$ ? $+ \mathbf{K} * (8)$ <u>90</u> ports < 2 $\rightarrow \phi \pi^+$ ) <u>CL%</u> 90 he following 90 reports <	$3.4 \times = 0$ $85 \times 4.8$ $(\pi^+)$ $92)^{(1)}$ $860 \times 2.0 \times = 0$ $870 \times 10^{-10}$ $870 \times 10^{-10}$	$10^{-3}$ for B( $D_s^+$ .036. ALEXANDER $\times 10^{-4}$ for B( = 0.036. )]/ $\Gamma_{total}$ <u>DOCUMENT ID</u> ALBRECHT $10^{-3}$ for B( $D_s^+$ .036. <u>DOCUMENT ID</u> ALEXANDER ata for averages ALBRECHT $\times 10^{-4}$ for B(	$\begin{array}{c} \rightarrow & \phi \pi \\ \hline & 93B \\ D_{s}^{+} \rightarrow \\ \hline & 93E \\ \hline & 0 \\ \hline \hline & 0 \\ \hline & 0 \\ \hline & 0 \\ \hline \hline & 0 \\ \hline \hline \hline & 0 \\ \hline \hline \hline & 0 \\ \hline \hline \hline \hline & 0 \\ \hline \hline$	$\frac{CN}{E2} \phi \pi^{+}$ $\frac{CN}{CG} \phi \pi^{+}$ $\frac{CN}{E2} \phi \pi^{+}$ $\frac{CN}{E2} \phi \pi^{+}$	$= 0.027. We$ $\frac{COMMENT}{e^+e^- \rightarrow}$ $= 0.027. We$	rescale to ou $\Gamma_{41}/\Gamma$ $\Upsilon(4S)$ We rescale to $\Gamma_{41}+\Gamma_{51}/\Gamma$ $\Upsilon(4S)$ rescale to ou $\Gamma_{42}/\Gamma$ $\Upsilon(4S)$ $\Upsilon(4S)$ We rescale to

Page 16

Created: 6/29/1998 12:28

<sup>88</sup> ALBRECHT 93E reports  $< 3.4 \times 10^{-3}$  for B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.027. We rescale to our best value B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.036.

 $\Gamma(D_s^{*+}\omega)/\Gamma_{\text{total}}$  $\Gamma_{43}/\Gamma$ VALUECL%DOCUMENT IDTECNCOMMENT<0.0007</td>9089ALEXANDER93BCLE2 $e^+e^- \rightarrow \Upsilon(4S)$ • • • We do not use the following data for averages, fits, limits, etc. • • • 90 <sup>90</sup> ALBRECHT 93E ARG  $e^+e^- \rightarrow \Upsilon(4S)$ < 0.0014  $^{89}$  ALEXANDER 93B reports  $< 6.8 imes 10^{-4}$  for B( $D_s^+ o \ \phi \pi^+$ ) = 0.037. We rescale to our best value B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.036. <sup>90</sup>ALBRECHT 93E reports  $< 1.9 \times 10^{-3}$  for B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.027. We rescale to our best value B( $D_{\epsilon}^+ \rightarrow \phi \pi^+$ ) = 0.036.  $\frac{\Gamma(D_s^+ a_1(1260)^0)}{\Gamma_{total}} / \Gamma_{total}$   $\frac{VALUE}{(0.0022)} = \frac{CL\%}{90} = \frac{DOCUMENT ID}{91} \frac{TECN}{ALBRECHT} = \frac{COMMENT}{93E} \frac{COMMENT}{e^+ e^-} \rightarrow \Upsilon(4S)$ Γ44/Γ <sup>91</sup>ALBRECHT 93E reports  $< 3.0 imes 10^{-3}$  for B( $D_s^+ o \phi \pi^+$ ) = 0.027. We rescale to our best value B( $D_{\epsilon}^{+} \rightarrow \phi \pi^{+}$ ) = 0.036.  $\Gamma(D_s^{*+}a_1(1260)^0)/\Gamma_{\text{total}}$ Γ<sub>45</sub>/Γ  $\frac{DOCUMENT \ ID}{92} \begin{array}{c} \underline{TECN} \\ ALBRECHT \\ 93E \\ ARG \\ e^+ e^- \rightarrow \\ \Upsilon(4S) \end{array}$ <u>CL%</u> 90 VALUE <0.0016  $^{92}\,{\sf ALBRECHT}$  93E reports  $<2.2\times10^{-3}$  for  ${\sf B}(D^+_s\to~\phi\pi^+)=$  0.027. We rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036$ .  $\Gamma(D_{s}^{+}\phi)/\Gamma_{\text{total}}$  $\Gamma_{46}/\Gamma$ VALUECL%DOCUMENT IDTECNCOMMENT<0.00032</td>9093ALEXANDER93BCLE2 $e^+e^- \rightarrow \Upsilon(4S)$ • • • We do not use the following data for averages, fits, limits, etc. • • • 90 <sup>94</sup> ALBRECHT 93E ARG  $e^+e^- \rightarrow \Upsilon(4S)$ < 0.0013  $^{93}$  ALEXANDER 93B reports  $< 3.1 \times 10^{-4}$  for B( $D_s^+ \rightarrow ~\phi \pi^+)$  = 0.037. We rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036$ . <sup>94</sup> ALBRECHT 93E reports  $< 1.7 imes 10^{-3}$  for B( $D_s^+ o \phi \pi^+$ ) = 0.027. We rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036$ .  $\Gamma(D_s^{*+}\phi)/\Gamma_{\text{total}}$  $\Gamma_{47}/\Gamma$ DOCUMENT ID TECN COMMENT VALUE <u>CL%</u> **<0.0004** 90 95 ALEXANDER 93B CLE2  $e^+e^- \rightarrow \Upsilon(4S)$ • • • We do not use the following data for averages, fits, limits, etc. • • <sup>96</sup> ALBRECHT 93E ARG  $e^+e^- \rightarrow \Upsilon(4S)$ 90 < 0.0016  $^{95}$  ALEXANDER 93B reports < 4.2 imes 10 $^{-4}$  for B( $D_{s}^{+} 
ightarrow \phi \pi^{+}$ ) = 0.037. We rescale to our best value B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.036. <sup>96</sup> ALBRECHT 93E reports  $< 2.1 \times 10^{-3}$  for B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.027. We rescale to our best value B( $D_s^+ \rightarrow \phi \pi^+$ ) = 0.036. HTTP://PDG.LBL.GOV Page 17 Created: 6/29/1998 12:28

$(U_s \cap J)/(total)$	CI 0/	DOCUMENT ID	TECN	CONANAENIT	I 48/I
<pre>//ALUE</pre>	00	97 ALEXANDER		$\frac{COMMENT}{a^+a^-}$	$\Upsilon(\Lambda S)$
• • • We do not use the	followi	ng data for average	s, fits, limits,	etc. $\bullet \bullet \bullet$	7 (43)
<0.0019	90	<sup>98</sup> ALBRECHT	93e ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
97 ALEXANDER 93B re	ports <	$10.3 imes10^{-4}$ for B	$(D^+ \rightarrow \phi \pi^-)$	$^{+}) = 0.037.$	We rescale t
our best value $B(D^+)$	$\rightarrow \phi_{2}$	$(\pi^+) = 0.036$	S	,	
<sup>98</sup> AI BRECHT 93F repo	orts $< 2$	$5 \times 10^{-3}$ for B(D <sup>+</sup>	$\rightarrow \phi \pi^+$	= 0.027 We	e rescale to ou
best value $B(D^+_s  o$	$\phi \pi^+)$	= 0.036.	<i>, , , , , , , , , ,</i>	0.0211 11	
$\Gamma(D_{s}^{*+}\overline{K}^{0})/\Gamma_{\text{total}}$					Г <sub>49</sub> /I
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<0.0011	90	<sup>99</sup> ALEXANDER	93B CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
• • • We do not use the	followi	ng data for average	s, fits, limits,	etc. • • •	
< 0.0023	90	100 ALBRECHT	93E ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>99</sup> ALEXANDER 93B re	ports <	$10.9 imes10^{-4}$ for B	$(D_{s}^{+} \rightarrow \phi \pi^{-})$	$^{+}) = 0.037.$	We rescale t
our best value $B(D_s^+)$	$\rightarrow \phi $	$\pi^+$ ) = 0.036.			
<sup>100</sup> ALBRECHT 93E repo	orts $< 3$	$0.1 imes 10^{-3}$ for B( $D_s^+$	$\rightarrow \phi \pi^+$ )	= 0.027. We	e rescale to ou
best value $B(D^+_{m{s}}  o$	$\phi \pi^+$ )	= 0.036.			
$\Gamma(D_s^+\overline{K}^*(892)^0)/\Gamma_{to}$	tal				Г <sub>50</sub> /І
VALUE	<u>CL%</u>	DOCUMENT ID	<u>TECN</u>	COMMENT	<b>22</b> ( + <b>2</b> )
<b>&lt;0.0005</b>	90	ALEXANDER	93B CLE2	$e^+e^- \rightarrow$	T(45)
ALEXANDER 93B re	ports <	$(4.4 \times 10^{-4} \text{ for B})$	$D_{s}^{+} \rightarrow \phi \pi^{-}$	<sup>⊢</sup> ) = 0.037.	We rescale t
our best value B( $D_s^+$	$\rightarrow \phi \gamma$	$(\pi^+) = 0.036.$			
Г( <i>D</i> * <sup>+</sup> <i>K</i> *(892) <sup>0</sup> )/Гъ	otal				Г <sub>51</sub> /І
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<0.0004	90	<sup>102</sup> ALEXANDER	93B CLE2	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>102</sup> ALEXANDER 93B re	ports <	$<$ 4.3 $ imes$ 10 $^{-4}$ for B(	$D_s^+ \rightarrow \phi \pi^-$	+) = 0.037.	We rescale t
our best value B( $D_s^+$	$\rightarrow \phi $	$(\pi^+) = 0.036.$			
$\Gamma(D_{s}^{-}\pi^{+}K^{+})/\Gamma_{total}$					Г <sub>52</sub> /І
VALUE	CL%	DOCUMENT ID	TECN	<u>COMMENT</u>	
<0.0008	90	<sup>103</sup> ALBRECHT	93e ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
<sup>103</sup> ALBRECHT 93E repo	orts $< 1$	$1  imes 10^{-3}$ for B(D	$\rightarrow \phi \pi^+$ )	= 0.027. We	e rescale to ou
best value B( $D^+_{m{s}}  ightarrow$	$\phi \pi^+$ )	= 0.036.			
$\Gamma(D_s^{*-}\pi^+K^+)/\Gamma_{tota}$	1				Г <sub>53</sub> /І
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	<u>COMMENT</u>	
<0.0012	90	<sup>104</sup> ALBRECHT	93e ARG	$e^+e^- \rightarrow$	$\Upsilon(4S)$
104 AL RECUT OF KORG	orts $< 1$	$6 \times 10^{-3}$ for B(D <sup>+</sup>	$\rightarrow \phi \pi^+$ )	= 0.027. We	e rescale to ou
ALDIVECTIT 325 Tepe			· · ·		
best value $B(D_s^+ \rightarrow$	$\phi \pi^+$ )	= 0.036.			

$\Gamma(D_{s}^{-}\pi^{+}K^{*}(892)^{+})/$	/Γ <sub>total</sub>				Г <sub>54</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<0.006	90 10	<sup>)5</sup> ALBRECHT	93e ARG	$e^+e^- \rightarrow $	$\Upsilon(4S)$
<sup>105</sup> ALBRECHT 93E repo	rts < 8.6	$ imes 10^{-3}$ for B( $D_s^+$	$(\stackrel{+}{\to} \phi \pi^+)$	= 0.027. We i	rescale to our
best value B( $D^+_{m{s}}  ightarrow$	$\phi \pi^+) =$	0.036.			
$\Gamma(D_s^{*-}\pi^+ K^*(892)^+)$	/Γ <sub>total</sub>		TECH	COMMENT	Г <sub>55</sub> /Г

VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
<0.008	90 1	<sup>06</sup> ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>106</sup> ALBRECHT 93E repo	rts $< 1.1$	$ imes 10^{-2}$ for B( $D_s^+$	$\rightarrow$	$\phi \pi^+) =$	= 0.027. We rescale to our
best value $B(D^+_{m{s}}  o$	$\phi \pi^+$ ) =	0.036.			

HTTP://PDG.LBL.GOV Page 19 Created: 6/29/1998 12:28