# b-quark polar angle in $b\bar{b}g$ events

$$A_p = A_b A_{QCD}$$

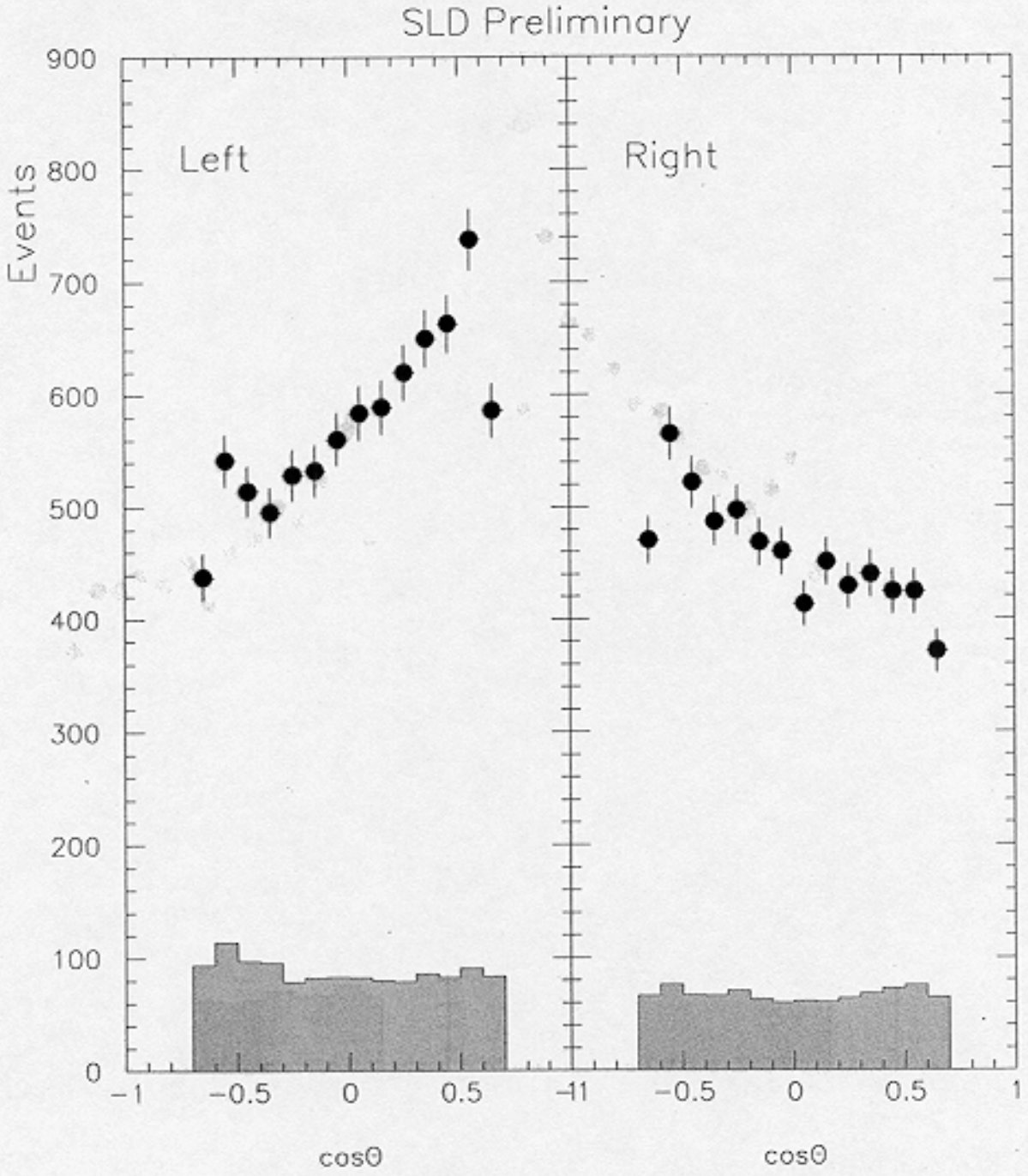



**Figure 3**

$A_{QCD} = 0.910 \pm 0.053 \pm 0.060$

c.f. $0.93$ $O(\alpha_s^2)$ QCD

# azimuthal angle in $b\bar{b}g$ events

$$A'_e = A_b A'_{QCD}$$

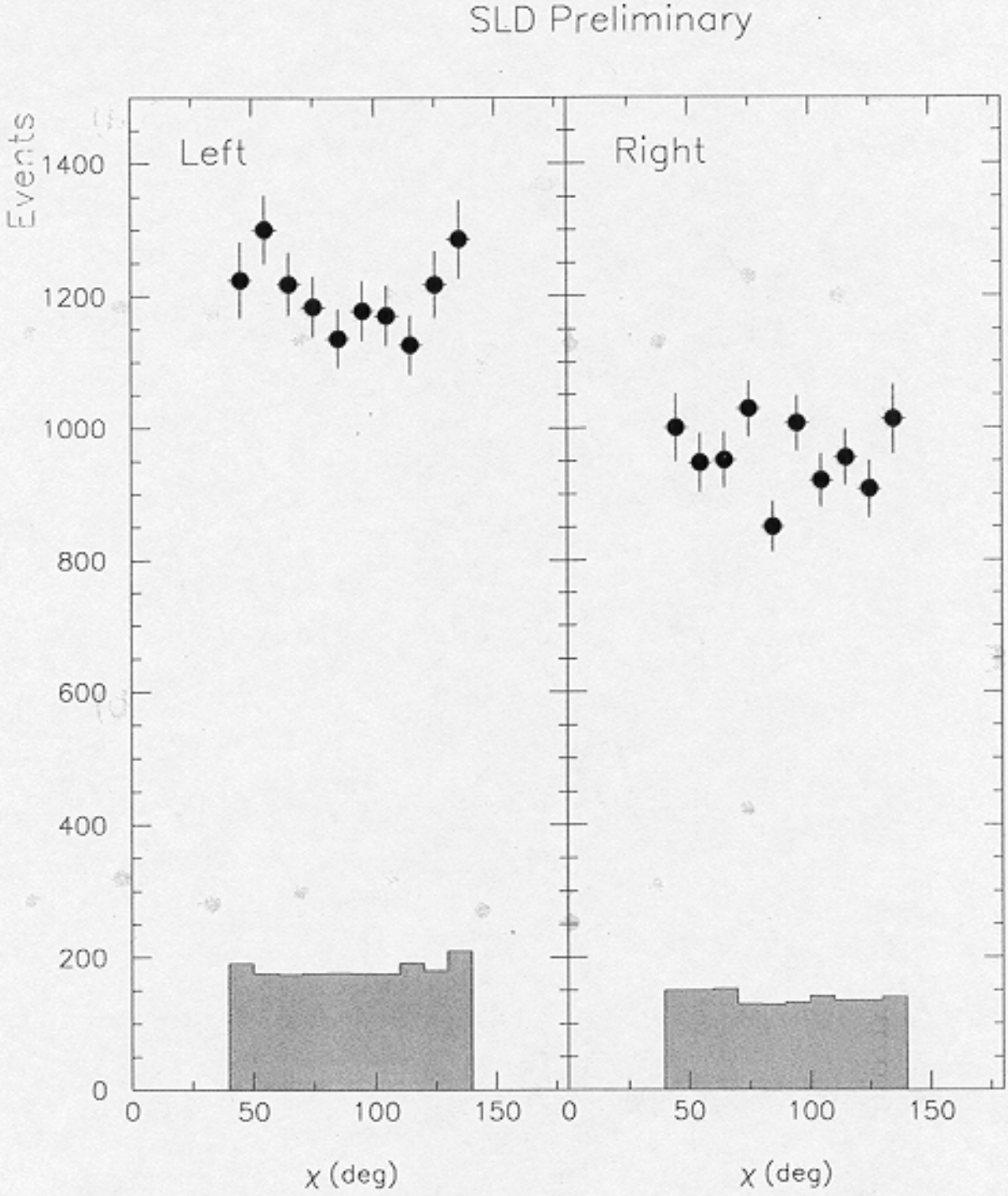



**Figure 4**

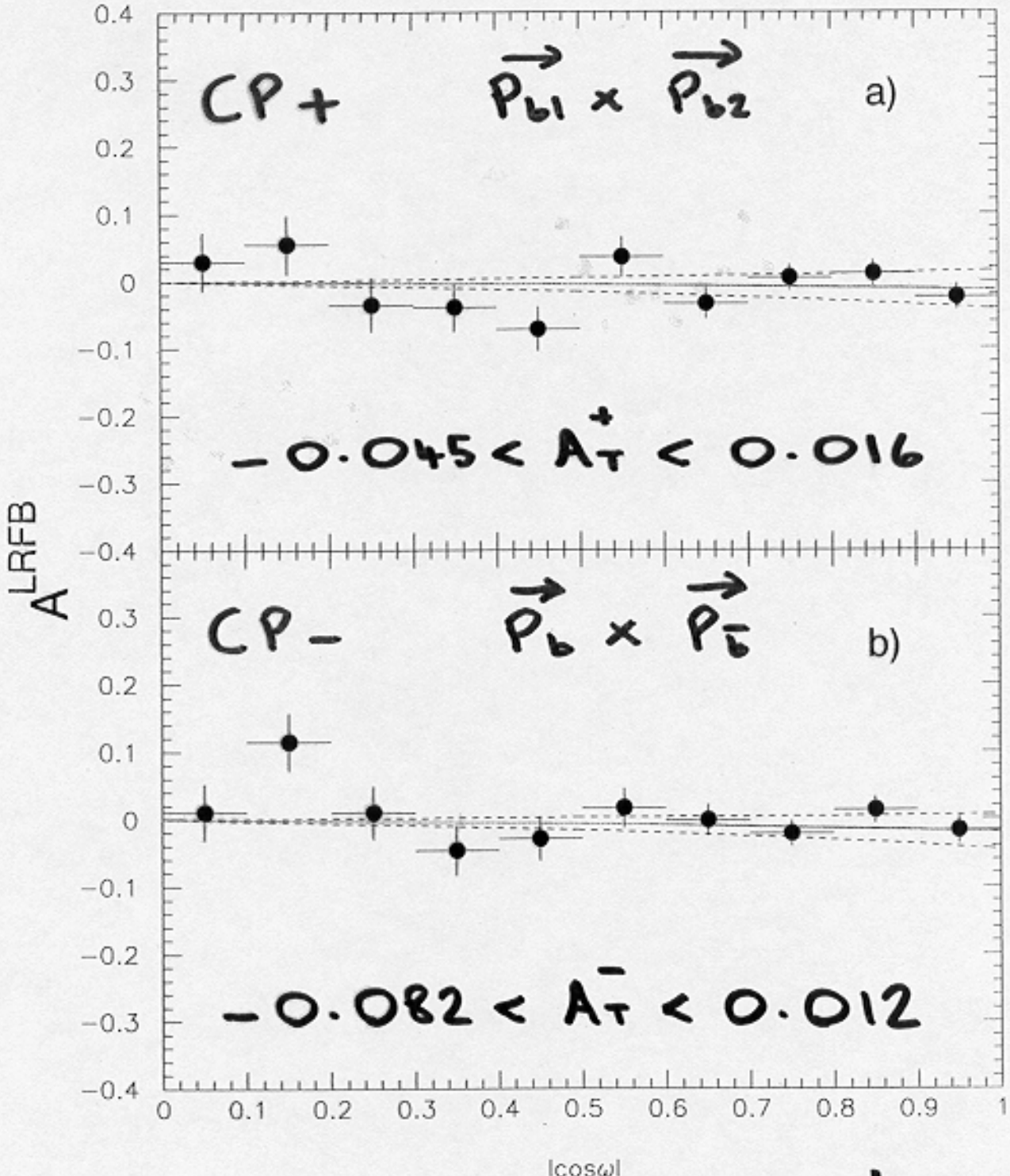
$$A'_{QCD} = -0.014 \pm 0.035 \pm 0.002$$

c.f. $-0.06$ $O(\alpha_s^2)$ QCD

$\cos\omega \propto \vec{P}_z \cdot \vec{P}_{b1} \times \vec{P}_{b2}$

SLD Preliminary (T −)

$\tilde{A}_{FB}$




$|\cos\omega|$

**Figure 5**

# $A_s$ Measurement

- Select 342 k hadronic events in 1993-8 data
- Select light flavor events
  - → suppress $c\bar{c}$, $b\bar{b}$ by requiring $n_{sig} = 0,1$
- Use high-momentum $K^{\pm}$, $\Lambda/\bar{\Lambda}$ and $K_s^o$ to tag the s quark
  - → $K^{\pm}$: $p > 9$ GeV, 92% purity with CRID particle ID
  - → $\Lambda/\bar{\Lambda}$, $K_s^o$: $p > 5$ GeV, 91% purity
- Tagging procedure
  - → tag highest-momentum strange particle in each hemisphere
  - → both hemispheres must have unequal strangeness
- Sign event thrust axis in $K^-$ direction
  - → $\cos\theta_s = \pm \cos\theta_{thrust}$
- Unbinned max. likelihood fit to $K^+ K^- \oplus K^{\pm} K_s^o$
- Evaluate systematic uncertainties

- Event sample

$$s\bar{s} \text{ analyzing power (A.P.): } a_s = \frac{N_s^{right} - N_s^{wrong}}{N_s^{right} + N_s^{wrong}}$$

| Mode | Data | MC | $s\bar{s}$ Purity | $s\bar{s}$ A.P. |
|---|---|---|---|---|
| $K^+ K^-$ | 1290 | 1312 | 0.73 | 0.95 |
| $K^\pm K_s^o$ | 1580 | 1617 | 0.60 | 0.70 |
| $K^+ \Lambda^o, K^- \bar{\Lambda}^o$ | 219 | 213 | 0.66 | 0.89 |
| $\Lambda^o \bar{\Lambda}^o$ | 17 | 14 | 0.57 | 0.70 |
| $\Lambda^o K_s^o, \bar{\Lambda}^o K_s^o$ | 193 | 194 | 0.50 | 0.32 |

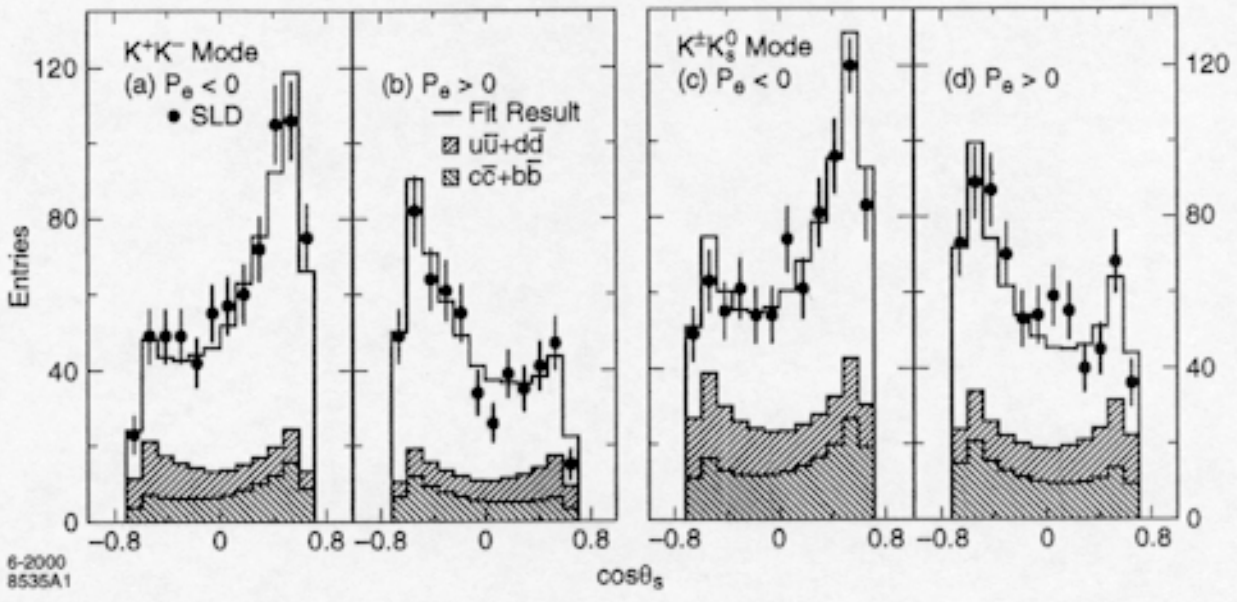
→ omit Λ tags (only used as cross checks)

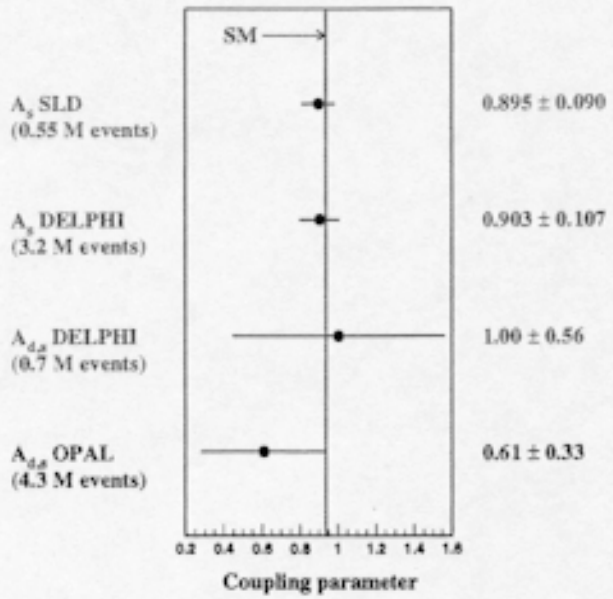
→ MC purity for $K^+ K^- \oplus K^\pm K_s^o$:

9% $u\bar{u}$, 8% $d\bar{d}$, 66% $s\bar{s}$, 16% $c\bar{c}$, 1% $b\bar{b}$

- Result submitted to PRL

$$A_s = 0.895 \pm 0.066(\text{stat.}) \pm 0.062(\text{syst.})$$




World average (2 $A_s$):

$A_s = 0.90 \pm 0.07$

↓

8% universality test
of down-type quark sector

- Systematic uncertainties for $K^+ K^- \oplus K^{\pm} K_s^o$

| Source | Comments | $\delta A_s/A_s$ |
|---|---|---|
| $a_s$ | calibration | 3.2% |
| $a_{ud}$<br>$A_{ud}$ | $a_{ud} = - a_s/2$<br>SM | 5.4% |
| $N_{ud}/N_s$ | calibration | 2.1% |
| heavy flavor sector | MC / world averages | 1.4% |
| hard gluon radiation | Stav-Olsen with bias | 0.6% |
| beam polarization | data | 0.6% |
| MC stat. | | 1.4% |
| Total: | | 6.9% |

# Graduate Students

Since last meeting:

Daming Dong (MIT)

Hermann Staengle (Col. State)

have graduated!

Vincenzo Lia (MIT)

Hyejoo Kang (Rutgers)

Gavin Nesom (Oxford)

still working hard!

# Papers I

Since last meeting:

| | |
|---|---|
| B fragmentation | Appeared PRL |
| strange-q $A_s$ | Subm. PRL |
| $b\bar{b}g$ symmetry | Draft PRL |
| | Reading July |

# Papers II

In preparation / planning:

| | |
|---|---|
| Improved B frag. | Fall 2000 |
| $g \to b\bar{b}$ | Late 2000 |
| $\Lambda$ polarisation | » |
| $b\bar{b}g$ structure | Mid 2001 |
| q/g jets | 2001 |
| Double B frag. | 2001 |
| Hadron correlations | 2001 |

# Conference Talks 2000

QCD Morioud, March

| | |
|---|---|
| $g \to b\bar{b}$ review | T. Abe |

QCD2000, July

| | |
|---|---|
| light quark frag. | M. Kalelkar |

ICHEP2000, July

| | |
|---|---|
| light quark frag. | P. Burrows |
| $b\bar{b}g$ events | T. Abe |

DPF Mtg., August

| | |
|---|---|
| q/g jets | H. Kang |
| $\Lambda$ polarisation | V. Lia |
| $b\bar{b}g$ structure | H. Akimoto |
| B fragmentation | G. Nesom |
| hadron correlations | D. Muller |

SLD QCD Group

will be

VERY active

thru 2001