



**Brookhaven**  
**National Laboratory**

BNL-101413-2014-TECH

AD/PH-17;BNL-101413-2013-IR

## b Physics At RHIC

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June 1986

Collider Accelerator Department  
**Brookhaven National Laboratory**

**U.S. Department of Energy**

USDOE Office of Science (SC)

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RHIC-PH-17

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## B Physics at RHIC

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In high energy hadronic collisions,  $b$  mesons are produced primarily by gluon-gluon fusion,

$$g + g \rightarrow b + \bar{b}. \quad (1)$$

At SSC energies this cross section is several hundred microbarns, making it potentially possible to study samples of  $10^{12}$   $b$  mesons to search for rare decays, CP violation, and other new phenomena with sensitivities not achievable in  $e^+e^-$  collisions. This was extensively discussed for the SSC in Snowmass 86, especially in the group headed by B. Cox and F. Gilman. There was much more optimism than previously, in part because people now believe it may be possible to use microvertex detectors at high luminosity and in part because it was realized that some rare, KM-suppressed decay modes have large CP-violating partial rate asymmetries.

The  $pp$  option of RHIC might offer an opportunity to do similar physics. However, at the lower energy the cross section calculated for the process in Eq. (1) is significantly lower, as is seen in the following table:

Collider	$\sqrt{s}$ (GeV)	$\sigma$ ( $\mu b$ )	$L$ ( $cm^{-2}$ )	$N_{b\bar{b}}$ ( $yr^{-1}$ )
RHIC	500	5.8	$2 \times 10^{31}$	$1.2 \times 10^9$
RHIC*	600	7.6	$10^{32}$	$7.6 \times 10^9$
SSC	40000	460.	$10^{33}$	$4.6 \times 10^{12}$

\* Includes upgrades described in the Conceptual Design Report.

Because of QCD scaling violations, the EHLQ parameterization of the gluon structure function at the typical value  $x = 2m_b/\sqrt{s}$  increases by a factor of 5 to 10 over this energy range; the rapidity distribution also becomes wider. It should be realized, however, that the gluon structure function is not known for the important values of  $x$ , especially for the SSC.

The following histograms show a number of distributions of the  $b$  mesons and of their decay products for RHIC at the two energies and for the SSC. Histogram 101 shows the  $p_T$  distribution; the mean value is of order  $m_b$  as expected. Histogram 102 shows the rapidity distribution for the  $b$  mesons. The distribution is quite wide at the SSC; the feeling at Snowmass was that it was better to work at moderately large rapidity to facilitate lepton identification. The distribution at RHIC is more central, and any experiment probably should be done at  $90^\circ$ . Histogram 103 shows the difference in the rapidities of the two  $b$  mesons in each event; for some measurements of CP-violation it is necessary to detect both. Histogram 104 shows a scatter plot of the two rapidities. Histogram 112 shows the maximum rapidity of any decay product from a  $b$  meson. Histogram 113 shows the difference between the minimum and the maximum rapidity, i.e., the range of rapidity covered by the decay products. The mean value is about 2 units, meaning that any useful detector must cover a range of this order. Histogram 114 shows the same information as a scatter plot.

In summary, the SSC has a substantial advantage over RHIC both in cross section and in luminosity for rare  $b$  decays and similar physics. Detection of standard-model CP-violation is difficult at the SSC and probably impossible at RHIC. But RHIC would offer a potential advantage over existing  $e^+e^-$  machines. To realize that advantage, it is probably necessary to build a detector covering at least  $\Delta y = \pm 1$  and  $\Delta\phi = 2\pi$  with high-resolution microvertex detectors, very good tracking and electromagnetic calorimetry, and sufficient hadronic calorimetry to allow a first-level trigger on a jet with  $p_T \sim 10$  GeV. It would clearly be advantageous to increase the luminosity.

## PT B MESON (RHIC 500)

HBOOK ID = 101

DATE 07/17/86

NO = 1

1.2	I
1.16	III
1.12	000I
1.08	IIII
1.04	III 0
1	I II
.96	0 0
.92	I II
.88	I0
.84	I
.8	
.76	
.72	I
.68	0 I
.64	I 0
.6	I
.56	
.52	
.48	
.44	I
.4	0
.36	I
.32	
.28	
.24	
.2	I
.16	0 III
.12	00
.08	0010
.04	0100000000000000 00 0 0

CHANNELS	10	0	1	2	3	4	5
	1	1234567890123456789012345678901234567890					

CONTENTS	1.	1111
*10**	3	0 136900109865 11100000000000000000000000000000
	0 476489122536 41165342111110000000000000000000	
	0 45463213567E 3607868082945443785111011010010000	
	0 267098632569L 30994264133080050838880880800080000	

LOW-EDGE	10	111111111111111111112222222222
	1.	1122334455 3899001122334455667788990011223344
	0	05

* ENTRIES =	4000	_L CHANNELS = .1155E-01	* UNDERFLOW = .0000E+00	* OVERFLOW = .0000E+00
* BIN WID =	.5000E+00	CHAN VALUE = .4161E+01	* R . M . S = .2568E+01	* ABNOR CHA= .0000E+00

### PT B MESON (RHIC 600)

HBOOK ID = 101

DATE 07/24/86

NO =

1.68	I
1.64	I
1.6	0
1.56	II
1.52	IIII
1.48	II 0
1.44	00 I
1.4	II I
1.36	II
1.32	
1.28	
1.24	I
1.2	I
1.16	0I
1.12	II
1.08	I0
1.04	I
1	
.96	
.92	I
.88	0
.84	I
.8	I
.76	
.72	
.68	I
.64	0
.6	I
.56	
.52	I
.48	0
.44	II
.4	0I
.36	I0
.32	I
.28	
.24	I
.2	0I
.16	00
.12	II00
.08	I0I0
.04	1010000000000000 000 0000

CHANNELS 10 0 1 2 3 4 5  
1 12345678901234567890123456789012345678901234567890

\* ENTRIES = 4000 \* ALL CHANNELS = 3E-01 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .2376E-05  
\* BIN WID = .5000E+00 \* MEAN VALUE = -3E+01 \* R . M . S = .2599E+01 \* ABNOR CHA= .0000E+00

### PT B MESON (SSC)

HBOOK ID = 101

DATE 07/17/86

NO =

8.4	I
8.2	II
8	II
7.8	100
7.6	III
7.4	10111
7.2	II I
7	01 0
6.8	I I
6.6	I I
6.4	I I
6.2	0
6	I I
5.8	I I
5.6	0 I
5.4	0 I
5.2	II
5	10
4.8	I
4.6	I
4.4	
4.2	I I
4	
3.8	0
3.6	I
3.4	I
3.2	0
3	II
2.8	II
2.6	00
2.4	III
2.2	0
2	II
1.8	011
1.6	100
1.4	III
1.2	0
1	1011
.8	1000
.6	III100111
.4	III10000010 0
.2	I 00 0000000000000000

CHANNELS 10 0 1 2 3 4 5  
1 12345678901234567890123456789012345678901234567890

**CONTENTS**    1. 23567776654332221111  
\*10\*\* 2 0 4044837791387055174418766443322102101111000000000  
0 94680495213329932787530953433348478396313993335310  
0 6243471225033758047902115097773194113812133777680  
0 4065751586052880388556507962226099017614177552570

\* ENTRIES = 4002 \* ALL CHA\_S = .9134E+00 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .1686E-02  
\* BIN WID = .5000E+00 \* MEAN VA\_ = .5197E+01 \* R . M . S = .3526E+01 \* ABNOR CHA= .0000E+00

## Y B MESON (RHIC 500)

HBOOK ID = 102

DATE 07/17/86

NO = 2

7.8		I	
7.6		II	
7.4		II	
7.2		00	
7		II	
6.8		III	
6.6		II I	
6.4	I	II0 II	
6.2	I	0I 0I	
6	0	0II IO	
5.8	I	II III	
5.6	I I	II	
5.4	I	0I	
5.2	I I	II	
5	I 0	IOI	
4.8	0 I	IO	
4.6	I I	II	
4.4	III	I I	
4.2	I I	IO	
4	0 0	II	
3.8	II I	0I	
3.6	I	I	
3.4	0	I	
3.2	I	I	
3	II	0	
2.8	IO	I	
2.6	IOI		
2.4	III	II	
2.2	0I	IO	
2	I	0I	
1.8	I	II	
1.6	0	I	
1.4	I	0I	
1.2	I	IO	
1	0	I	
.8	IO		
.6	0I	IOI	
.4	I	0IO	
.2	0 0	0	

CHANNELS 10 0 1 2 3 4 5  
           1 12345678901234567890123456789012345678901234567890

CONTENTS 1. 122233435456677655443421211  
       \*10\*\* 4 0 0000000046941463969989121119396709902134300000000  
           0 00000040490976311939575265002230602948433650000000  
           0 0000000095117064941772335252769322192797170000000  
           0 00000020292831411182372268662204653038510770000000

LOW-EDGE 1. 5444443333222211111 11111222223333344444  
       0 086420864208642086420246802468024680246802468

\* ENTRIES = 4000 \* ALL CHANNELS = .1155E-01 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
   \* BIN WID = .2000E+00 \* MEAN VALUE = .1673E-01 \* R . M . S = .1319E+01 \* ABNOR CHA= .0000E+00

## Y B MESON (RHIC 600)

HBOOK 102

ATE 07/24/86

NO =

10		I	
9.75		I	
9.5		0	
9.25			II
9		III	III
8.75		III0II	
8.5		III 0I	
8.25		00I II	
8		III III	
7.75		III 10I	
7.5		I II	
7.25		0 I0	I
7		I	I
6.75		I I	0
6.5		I I	
6.25		I 0	
6		0 .I	
5.75		IIII	I I I
5.5		II0	I I I
5.25		0I	0 0I0
5		0	
4.75		II	I IIII
4.5		I I	I 0I
4.25		II0	I II
4		0II	I0
3.75		II0	I
3.5		0II	II
3.25		I	0
3			I
2.75		I	II
2.5		0	0
2.25		I	I
2			I
1.75		II	0
1.5		00	III
1.25		II	0
1			I 0
.75		III	I0
.5		000	I
.25		00	I

**CONTENTS**      1.1.      112333455567888987756545433211  
\*10\*\* 4      00000003444333861802101153362050148042675100-3  
00000559981685188266268803282067638213851205-3  
000002227747918943563357125865900444833601900-3  
000007748594831088824188812038660872151982105-3

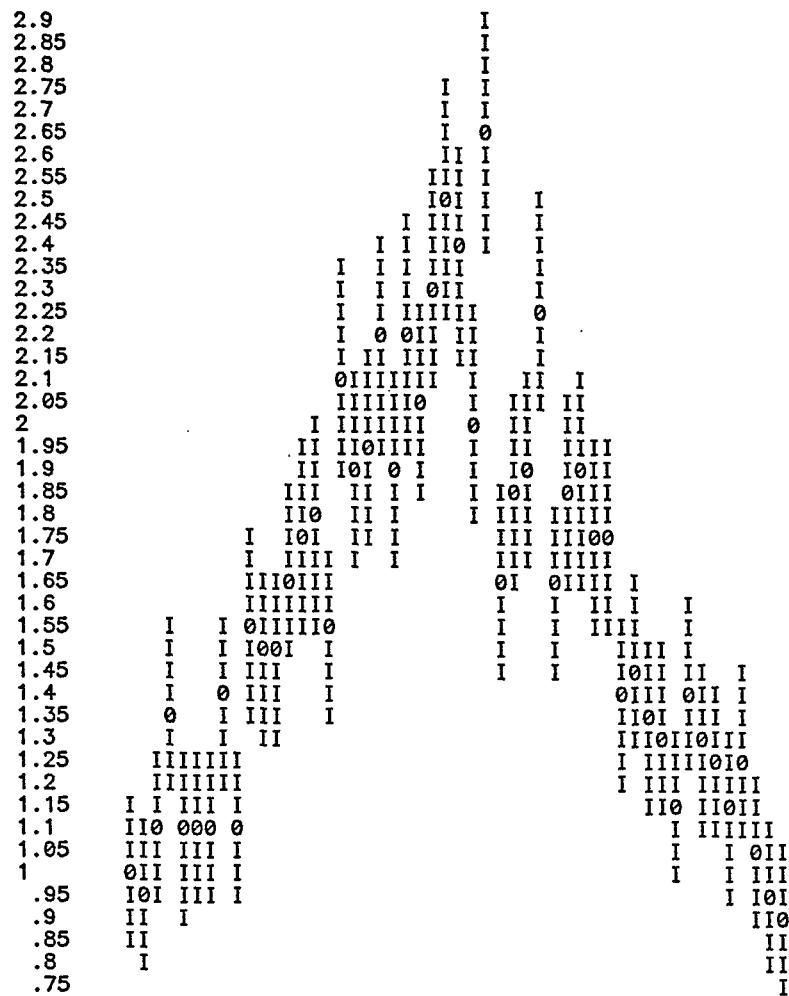
\* ENTRIES = 4000 \* ALL CHANNELS = .1528E-01 UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .5164E-02 . M . S = .1414E+01 \* ABNOR CHA= .0000E+00

Y B MESON (SSC)

HBOOK ID = 102

DATE 07/17/86

NO = 2



CHANNELS	10	0	1	2	3	4	5
1	12345678901234567890123456789012345678901234567890						

CONTENTS	1.	111111111111112112122222121112111111111111111111111
*10** 2	0	99030003054467750891810243966882688773432132212098
	0	72635886826642508827671995832373025405417287294316
	0	65664471111147059390086207306390512271228420486046
	0	91271915198884644314817702100855115306503651319977

LOW-EDGE

1.	544444333332222211111	11111222223333344444
----	-----------------------	----------------------

0 08642086420864208642086420246802468024680246802468

\* ENTRIES = 4002 \* ALL CHANNELS = .7878E+00 \* UNDERFLOW = .6403E-01 \* OVERFLOW = .6322E-01  
\* BIN WID = .2000E+00 \* MEAN VALUE = -.2369E-01 \* R . M . S = .2544E+01 \* ABNOR CHA= .0000E+00

## Y1-Y2 B MESONS (RHIC 50)

HBOOK ID = 1E

DATE 07/17/86

NO =

8.2	I
8	I
7.8	I
7.6	I
7.4	I
7.2	I
7	II
6.8	II
6.6	0I
6.4	10
6.2	II
6	II
5.8	0
5.6	III
5.4	III
5.2	010
5	I
4.8	I
4.6	I
4.4	I
4.2	I
4	I
3.8	I
3.6	I
3.4	I
3.2	I
3	I
2.8	I
2.6	I
2.4	I
2.2	I
2	I
1.8	I
1.6	I
1.4	I
1.2	I
1	I
.8	I
.6	I
.4	I
.2	I

\* ENTRIES = 2000 \* ALL CHANNELS = .5774E-02 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .1065E+01 \* R . M . S = .8137E+00 \* ABNOR CHA= .0000E+00

## Y1-Y2 B MESONS (RHIC 600)

HBOOK ID = 103

DATE 07/24/86

NO. =

9.5	I
9.25	I
9	0I
8.75	II
8.5	I0I
8.25	IIII
8	IIII
7.75	0II
7.5	I00
7.25	IIII
7	III
6.75	I0
6.5	I
6.25	I I
6	II
5.75	I0
5.5	0I
5.25	II
5	I I
4.75	0
4.5	I
4.25	I
4	I
3.75	0
3.5	II
3.25	II
3	0
2.75	I I
2.5	II
2.25	00
2	II
1.75	I
1.5	0
1.25	I
1	II
.75	00
.5	I 000000
.25	00000000

CHANNELS 10 0 1 2 3 4 5  
1 123456789012345678901234567890123456789012345678901234567890

\* ENTRIES = 2000 \* ALL CHANNELS = .7642E-02 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .1115E+01 \* R . M . S = .8215E+00 \* ABNOR CHA= .0000E+00

## **Y1-Y2 B MESONS (SSC)**

HBOC OK ID = 103

DATE 07/17/86

NO =

4.6	I I
4.4	OII
4.2	II0I
4	I0II
3.8	I O I
3.6	IIII0
3.4	000II
3.2	III 0I
3	I I II
2.8	I0
2.6	I
2.4	I
2.2	0
2	I I
1.8	I0
1.6	0I
1.4	I 0I
1.2	I0
1	I
.8	OI
.6	I00
.4	III000
.2	0IIII00000
0	00

CHAR CHANNELS 10 0 1 2 3  
1 123456789012345678901234567890123456789012345678901234567890

\* ENTRIES = 1999 \* ALL CHANNELS = .4571-- \* UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
 \* EXIT WID = .2000E+00 \* MEAN VALUE = .1359- \* R . M . S = .9944E+00 \* ABNOR CHA= .0000E+00

## Y1 VS. Y2 B MESONS (RHIC 500)

HBOOK ID = 104

DATE 07/17/86

NO = 4

CHANNELS 10 U 0 1 2 O A  
 1 N 12345678901234567890 V B

\*\*\*\*\*

ABN	*	* ABN
OVE	*	* OVE
4.5	*	* 20
4	*	* 19
3.5	*	* 18
3	*	* 17
2.5	*	* 16
2	*	* 15
1.5	*	* 14
1	*	* 13
.5	*	* 12
- .5	*	* 11
- 1	*	* 10
- 1.5	*	* 9
- 2	*	* 8
- 2.5	*	* 7
- 3	*	* 6
- 3.5	*	* 5
- 4	*	* 4
- 4.5	*	* 3
- 5	*	* 2
UND	*	* UND

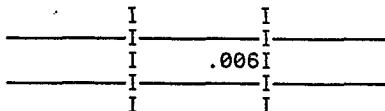
\*\*\*\*\*

LOW-EDGE

1.	544332211	11223344
0	050505050505050505	

\*  
 \* ENTRIES = 2000  
 \* SATURATION AT= INFINITY  
 \* SCALE .,+2,3,..., A,B,  
 \* STEP = \* MINIMUM=0

PLOT STATISTICS



\* CONTENT MIN = .00000E+00 MAX = .19888E-03

## Y1 VS. Y2 B MESONS (RHIC 600)

HBOOK ID = 104

D: 07/24/86

NO = 4

CHANNELS 10 U 0 1 2 O A  
 1 N 12345678901234567890 V B

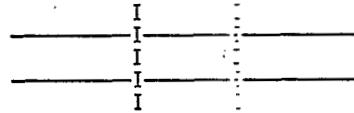
		* ABN
ABN	*	* OVE
OVE	*	* 20
4.5	*	* 19
4	*	* 18
3.5	*	* 17
3	*	* 16
2.5	*	* 15
2	*	* 14
1.5	*	* 13
1	*	* 12
.5	*	* 11
- .5	*	* 10
- 1	*	* 9
- 1.5	*	* 8
- 2	*	* 7
- 2.5	*	* 6
- 3	*	* 5
- 3.5	*	* 4
- 4	*	* 3
- 4.5	*	* 2
- 5	*	* 1
UND	*	* UND

## LOW-EDGE

1. 54332211 11223344  
 0 0505050505050505050505

\*  
 \* ENTRIES = 22000  
 \* SATURATION AT = INFINITY  
 \* SCALE .,+,.2,.3,.4,.5,.6,.7,.8,.9,.A,.B,  
 \* STEP = .00000E+00 MINIMUM=0

PLOT



STATISTICS

\* CONTENT MIN = .00000E+00 MAX = .19158E-03

Y1 VS. Y2 - ESONS (SSC)

HBOOK = 104

DATE 07/17/86

NO = 4

CHANNELS J 0 1 2 0 A  
V 12345678901234567890 V B

\*\*\*\*\*  
ABN OVE . . . 233 H \* OVE  
4.5 .....+.+ 3 \* 20  
4 . . . +2+2 4 \* 19  
3.5 .....+++++ 4 \* 18  
3 . . . ++.++++ 2 \* 17  
2.5 .. .++22+2222+ . + \* 16  
2 . +.32222.+. . \* 15  
1.5 .+.22.3+22+.. \* 14  
1 . . .+222+2422+... . \* 13  
.5 . . .+332222++.... . \* 12  
-.5 . . .+2233342++.... \* 11  
- 1 . . .+2223342++... \* 10  
- 1.5 . . .+222422.2+.... \* 8  
- 2 . . .2+2+2222+... . \* 7  
- 2.5 + ..+32+2+.22. . \* 6  
- 3 + ++.232++2.... . \* 5  
- 3.5 + .++.+++. . . \* 4  
- 4 2 +++.++.... \* 3  
- 4.5 3 +22+.++ .. \* 2  
- 5 2 .2+++. . \* 1  
UND I 4+3++.... \* UND  
\*\*\*\*\*

LOW-EDGE

544332211 11223344  
05050505050505050505

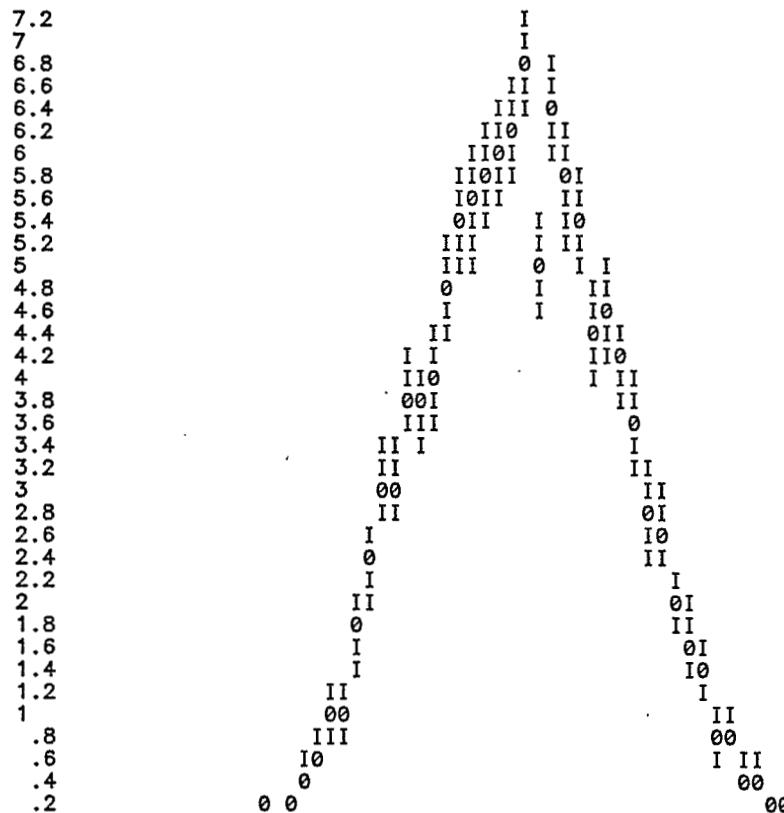
\*  
\* ENTRI= 1999 PLOT I .011I .017  
\* SATURAT AT= INFINITY .014I .366I .017  
\* SCALE ,2,3,..., A,B,  
\* STEP .001 \* MINIMUM=0 STATISTICS I .018I .013I  
  
\* CONTE N = .00000E+00 MAX = .46118E-02

## YMAX DECAY PRODUCTS (RHIC 500)

HBOOK ID = 112

DATE 07/17/86

NO = 7



CHANNELS 10 0 1 2 3 4 5  
1 12345678901234567890123456789012345678901234567890

CONTENTS 1. 12223334555566465544322111  
\*10\*\* 4 0 00000000000013599629976973479069263350475953773300  
0 00000000040188330157454356160775814631501370696478  
0 0000000000056798677281879289555413342215828689650  
0 0000000002057626818259517788673540166758413081534

LOW-EDGE 1. 5444443333222211111 11111222223333444444  
0 086420864208642086420246802468024680246802468

\* ENTRIES = 4000 \* ALL CHANNELS = .1151E-01 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .3793E-04  
\* BIN WID = .2000E+00 \* MEAN VALUE = .1006E+01 \* R . M . S = .1410E+01 \* ABNOR CHA= .0000E+00

## YMAX DECAY (RHIC 600)

HBOOK ID = 112

DATE 07/24/86

NO = 7

9.25	I
9	II
8.75	0II
8.5	IIOI
8.25	IOII
8	IIII0
7.75	II III
7.5	I0 I I
7.25	I0I I
7	III II I
6.75	0II II 0
6.5	I 0I I
6.25	II IOII
6	II III I
5.75	0 I0 I
5.5	III I 0I I
5.25	III I II I
5	00 I0 0
4.75	I III I I
4.5	0II I I
4.25	I0 I I
4	I0I 0 I
3.75	II I 0
3.5	I I I
3.25	II
3	0I
2.75	0
2.5	I
2.25	II
2	0
1.75	I I
1.5	I0
1.25	0II
1	I 0
.75	I
.5	0 00I
.25	00 I0

CHANNELS 10 0 1 2 3 4 5  
           1 12345678901234 2 0123456789012345678901234567890

CONTENTS 1. -2434445677888766565434322111  
 \*10\*\* 4 0 0000000001047 32819965125028426728786858049432  
   0 0000000002599 6518672297572043094762746539653  
   0 0000000009273 26569043276606712910068275180884  
   0 0000000001782 33664500162753418995630181364944

LOW-EDGE 1. 544444333322 11 11111222223333444444  
   0 08642086420864 -2086420246802468024680246802468

\* ENTRIES = 4000    \* CHANNELS = .1524E-01    \* UNDERFLOW = .0000E+00    \* OVERFLOW = .4110E-04  
 \* BIN WID = .2000E+00    \* VALUE = .1002E+01    \* R . M . S = .1504E+01    \* ABNOR CHA= .0000E+00

## YMAX DECAY PRODUCTS (SSC)

HBOOK ID = 112

DATE 07/17/86

NO = 7

3  
 2.9  
 2.8  
 2.7  
 2.6  
 2.5  
 2.4  
 2.3  
 2.2  
 2.1  
 2  
 1.9  
 1.8  
 1.7  
 1.6  
 1.5  
 1.4  
 1.3  
 1.2  
 1.1  
 1  
 .9  
 .8  
 .7  
 .6  
 .5  
 .4

I I I  
 II I I  
 IO I  
 OI O  
 II II  
 I I I III I  
 II III OI I  
 I III III OII IO I I  
 I II O 100 II IIII  
 I III IOI III II IIII0  
 III0 OII III III 1000I I  
 I I OIOI III IIIIIIII I  
 O I II0II I 0III II 0  
 III 0 0III I I 00 III  
 IIII III I I III000 0 III  
 I I IOO IIII 0 III I 000  
 0 II0II I 0 I III I 000  
 III00III 0 I I III IIIII  
 I OIIII I I 0 I  
 0 I 0 I I  
 III I I I  
 II0I  
 IO IO  
 OI I  
 I  
 I

CHANNELS 10 0 1 2 3 4 5  
 1 12345678901234567890123456789012345678901234567890

CONTENTS 1. 11 111111111111111122222222111111111111111  
 \*10\*\* 2 0 56976029112336152576783890561005216888955333630222  
 0 09254005834457724054194931290389159972872217173838  
 0 32202878653534263162567950516278496399737286549622  
 0 11955382911030531566302976270625546859579404022667

LOW-EDGE 1. 54444433333222221111 1111122222333344444  
 0 086420864208642086420246802468024680246802468

\* ENTRIES = 3998 \* ALL CHANNELS = .7692E+00 \* UNDERFLOW = .2787E-01 \* OVERFLOW = .1172E+00  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .3882E+00 \* R . M . S = .2524E+01 \* ABNOR CHA= .0000E+00

### YMAX-YMIN DECAY PRODUCTS (RHIC 500)

HBOOK ID = 113

DATE 07/17/86

NO = 8

CHANNELS 10 0 1 2 3 4 5  
1 12345678901234567890123456789012345678901234567890

\* ENTRIES = 4000 \* ALL CHANNELS = .1155E-01 \* UNDERFLOW = .0000E+00 \* OVERFLOW = .0000E+00  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .2022E+01 \* R . M . S = .8199E+00 \* ABNOR CHA= .0000E+00

### YMAX-YMIN DECAY (RHIC 600)

HBOOK ID = 113

DATE 07/24/86

NO = 8

1.75	I
1.7	0
1.65	II
1.6	III
1.55	0 0 I
1.5	I 10 I
1.45	I II
1.4	10
1.35	I
1.3	I
1.25	I
1.2	0
1.15	I
1.1	I
1.05	I
1	0
.95	I
.9	I
.85	I
.8	I
.75	I
.7	I
.65	0
.6	I
.55	I
.5	0 I
.45	10
.4	I
.35	I
.3	00
.25	II
.2	0
.15	II
.1	0 I
.05	0000000000

CHANNELS 10 0 1 2 3 4 5  
1 12345678901234567890123456789012345678901234567890

\* ENTRIES = 4000 \* ALL CHANNELS = .1528E-01 \* UNDERFLOW = .0000E+000 \* OVERFLOW = .0000E+000  
 \* BIN WID = .2000E+00 \* MEAN VALUE = .2031E+01 \* R . M . S = .8276E+000 \* ABNOR CHA= .0000E+000

## **YMAX-YMIN DECAY PRODUCTS (SSC)**

HBOOK ID = 113

• 07/17/86

NO - 3

1.075	I	I
1.05	I	I
1.025	0	II
1	II	II
.975	II	II
.95	0I	I
.925	II	II
.9	0	I
.875	I	I
.85	I	II
.825	I	I
.8	10	0
.775	II	I
.75	0I	I
.725	I	
.7		
.675		
.65		I
.625		0I
.6		II
.575		I0
.55		I
.525	I	I
.5	0	I
.475	I	0
.45		I
.425		
.4		
.375		
.35	I	I
.325	0	0
.3	I	II
.275		0
.25		II
.225		0
.2		I
.175	0	0
.15	I	II
.125		0
.1		II
.075		01
.05		I
.025		0001
	60	
		I 00000 0 0000

• EES = 3998      • ALL CHANNELS = .9120E+00      \* UNDERFLOW = .0000E+00      \* OVERFLOW = .2287E-02  
• E-ID = .2000E+00      \* MEAN VALUE = .1946E+01      \* R . M . S = .8548E+00      \* ABNOR CHA= .0000E+00

## YMIN VS. YMAX DECAY PRODUCTS (RHIC 500)

HBOOK ID = 114

DATE 07/17/86

NO = 9

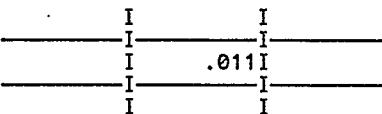
CHANNELS 10 U 0 1 2 O A  
 1 N 12345678901234567890 V B  
 \*\*\*\*\*  
 ABN \* \* ABN  
 OVE \* \* OVE  
 4.5 \* . . . . . \* 20  
 4 \* . . . + + + . \* 19  
 3.5 \* . . . + 233 + \* 18  
 3 \* . . . + 3674 . \* 17  
 2.5 \* . . . + 256992 . \* 16  
 2 \* . . . 227BBC6 . \* 15  
 1.5 \* . . . + 48EHF8 + \* 14  
 1 \* . . . 36AKI8 + \* 13  
 .5 \* . . . + 26BGJD2 . \* 12  
 \* .5 \* . . . 59IGC2 . \* 11  
 -- 1 \* . . . 37BG92 . \* 10  
 -- 1 \* . . . + 259D7 + . \* 9  
 -- 1.5 \* . . . + 38852 . \* 8  
 -- 2 \* . . . 343 .. \* 7  
 -- 2.5 \* . . . + + + . \* 6  
 -- 3 \* . . . . . \* 5  
 -- 3.5 \* . . . . . \* 4  
 -- 4 \* . . . . . \* 3  
 -- 4.5 \* . . . . . \* 2  
 -- 5 \* . . . . . \* 1  
 UND \* . . . . . \* UND  
 \*\*\*\*\*

LOW-EDGE

1.	544332211	11223344
0	05050505050505050505	

\*  
 \* ENTRIES = 4000  
 \* SATURATION AT= INFINITY  
 \* SCALE .,+2,3,..., A,B,  
 \* STEP = \* MINIMUM=0

PLOT STATISTICS



\* CONTENT MIN = .00000E+00 MAX = .41021E-03

## YMIN VS. YMAX DECAY (RHIC 600)

HBOOK ID = 114

DATE 07/24/86

NO = 9

CHANNELS 10 U 0 1  
1 N 1234567890123456789E

```
*****
ABN   *          • ABN
OVE   *          • OVE
4.5   *          . .... * 20
4     *          .+.+2232+ * 19
3.5   *          .+.+4532. * 18
3     *          .+.+359863. * 17
2.5   *          .+.+46BDA5. * 16
2     *          .236IEDA+ * 15
1.5   *          ...257CHE92. * 14
1     *          ..+.+5BG00A4 * 13
.5    *          ..+.+56GR0F3 * 12
      *          .+.+25DLLG2 * 11
-.5   *          .+.+249FHB3 * 10
-- 1   *          .+.+47CG62. * 9
-- 1.5  *          .278C92. * 8
-- 2   *          .+.+2574+ * 7
-- 2.5  *          .+.223+ * 6
-- 3   *          .+.+. * 5
-- 3.5  *          .+. * 4
-- 4   *          .+. * 3
-- 4.5  *          .+. * 2
-- 5   *          .+. * 1
UND   *          * UND
*****
```

## LOW-EDGE

1.	544332211	1122334
0	05050505050505050505	

```
* ENTRIES = 4000
* SATURATION AT= INFINITY
* SCALE .,+2,3,..., A,B,
* STEP = * MINIMUM=0
```

PLOT      I      I  
 STATISTICS    I      .015I      I

```
* CONTENT MIN = .00000E+00 MAX 55739E-03
```

## YMIN VS. YMAX DECAY PRODUCTS (SSC)

HBOOK ID = 114

DATE 07/17/86

NO = 9

CHANNELS 10 U 0 1 2 0 A  
1 N 12345678901234567890 V B

\*\*\*\*\*

	ABN	*	ABN
OVE	*	.	OVE
4.5	*	. . . . . 258DJHK P	*
4	*	. . . +24695.	* 20
3.5	*	. . . +26763.	* 19
3	*	. . . 2337A43	* 18
2.5	*	. . . . . +26795+	* 17
2	*	. . . . . +2378B72	* 16
1.5	*	. . . +2579B92	* 15
1	*	. . . 24ACBB2.	* 14
.5	*	. . . 348BD92	* 13
	*	. . . . . +47CHA2	* 12
-	.	. . . +45BD52	* 11
-	1	. . . +35CA53.	* 10
-	1.5	. . . 35A7A+	* 9
-	2	* 2 227A7+.	* 8
-	2.5	* 4 46B52	* 7
-	3	* 9 6842.	* 6
-	3.5	* G 53..	* 5
-	4	* K 6..	* 4
-	4.5	* H .	* 3
-	5	* G .	* 2
UND	*	R	* UND

\*\*\*\*\*

## LOW-EDGE

1. 544332211 11223344  
0 05050505050505050505

\*  
 \* ENTRIES = 3998  
 \* SATURATION AT= INFINITY  
 \* SCALE .,+2,3,..., A,B,  
 \* STEP = .001 \* MINIMUM=0

PLOT STATISTICS

.001I	.091I	.026
I-----I	I-----I	I-----I
.09	.679I	
I-----I	I-----I	
.028I		I-----I
I-----I		I-----I

\* CONTENT MIN = .00000E+00 MAX = .17610E-01