

Future Plan of BEPC

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- 1. present status of BEPC & BES**
- 2. plan for next few years**
- 3. further plans**
 - * τ -c Factory**
 - * BEPC II**
 - * non-accelerator physics**
 - * international collaborations**

1. present status of BEPC and BES:

upgrade reached goals:

BEPC: luminosity $\sim 4.5 \times 10^{30}$ at J/ψ energy
linac injection energy reached 1.55
GeV (full energy injection @ J/ψ)
5 month for physics
3 month for SR

BES:

- new drift chamber (MDC II)**
HV splitting ($\pm 2KV$) solved the problem
of feed through
- new barrel TOF system (180 ps)**
- refurbished Mark III vertex**
Chamber + Be beam pipe
- improvement of on-line system**
- new luminosity monitor (on line**
monitoring)
- R scan (see slides and table)**
error bar: stat 2%~10%
syst 7%~9%

BES R scan

March-May, 1998:

6 energy points

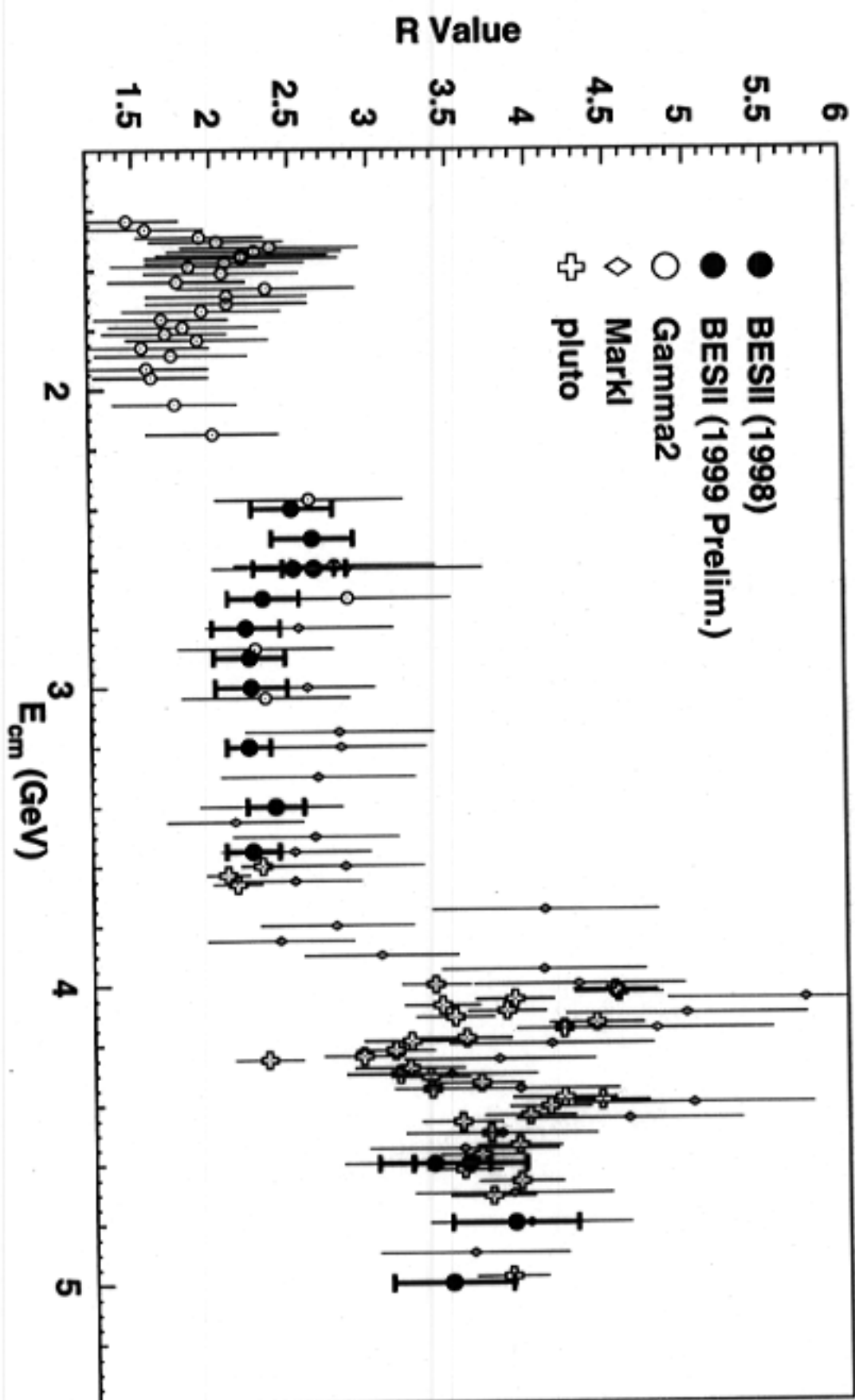
(2.6, 3.2, 3.4, 3.55, 4.6, 5.0 GeV)

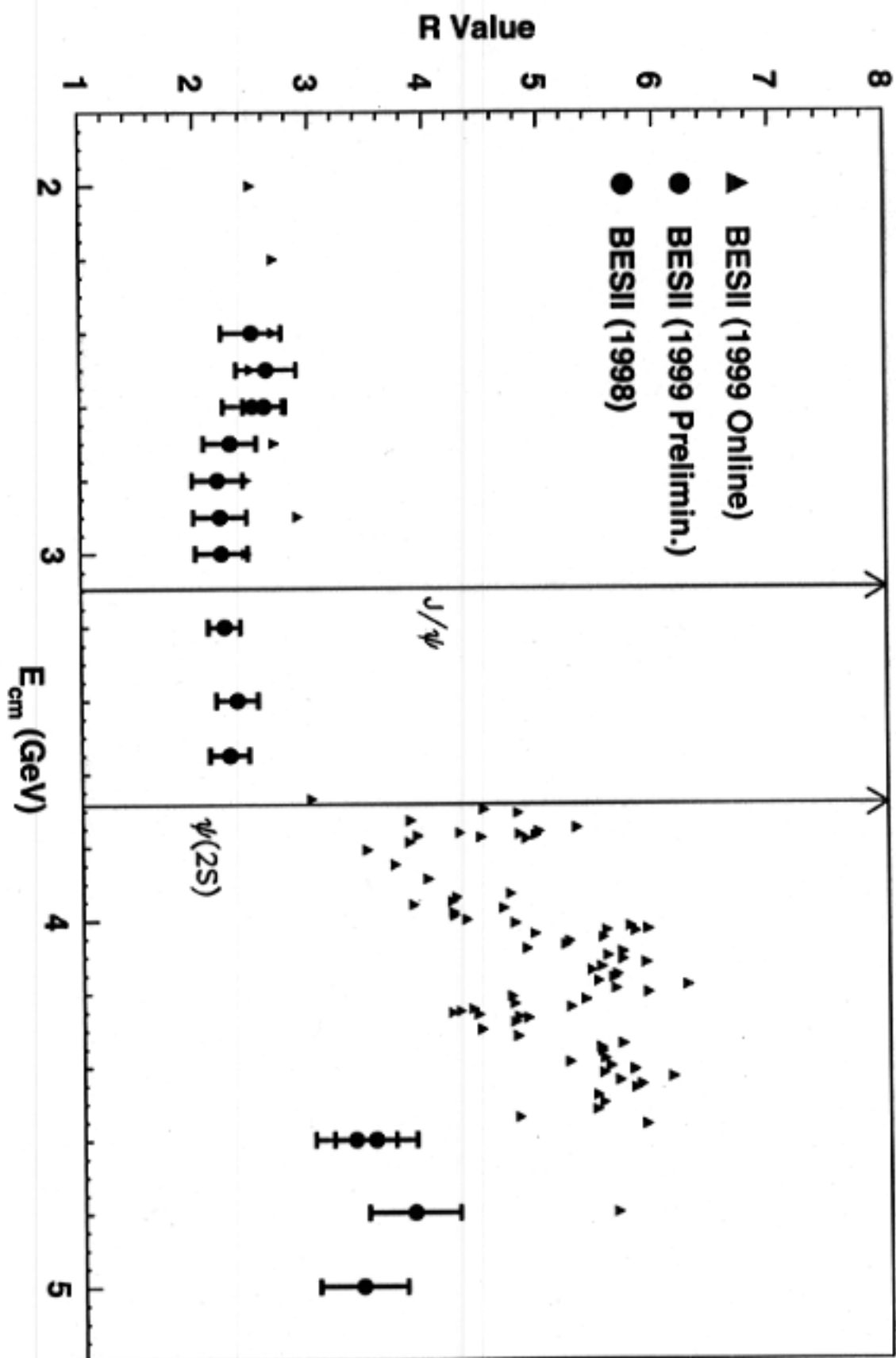
large N_{had} at 2.6, 3.55

Feb.- June, 1999:

85 energy points (2-4.8 GeV)

+ detailed scan of $\psi(2S)$ (24 points)





Results of the first R scan

Table 6: Summary of R, data and values

E_{cm} (GeV)	N_{had}^{obs}	N_{bg}	$\mathcal{L}$ (nb ⁻¹)	ϵ_{had} (%)	$1 + \delta$	R	Stat. error	Sys. error
2.60	5617	127	292.9	54.82	1.009	2.61	0.05(1.8%)	0.17(6.7%)
3.20	2051	100	109.3	64.30	1.447	2.26	0.07(3.2%)	0.13(5.6%)
3.40	2149	178	135.3	69.61	1.173	2.37	0.07(3.1%)	0.16(6.8%)
3.55	2672	216	200.2	68.40	1.125	2.30	0.06(2.7%)	0.16(6.9%)
4.60	1497	282	87.7	82.27	1.079	3.56	0.20(5.6%)	0.29(8.2%)
5.00	1648	463	102.3	84.53	1.068	3.45	0.32(9.4%)	0.29(8.4%)

Table 7: Contributions to systematic errors. All errors are in percentages (%)

E_{cm}	sele.	f_{bg}	$\mathcal{L}$	τ -pair	Bhabha	ϵ_{had}	Trig.	$1+\delta$	ALL
2.60	5.1	0.06	2.12	0.00	0.04	2.60	0.50	2.58	6.7
3.20	3.8	0.15	2.83	0.00	0.04	1.90	0.50	2.17	5.6
3.40	4.6	0.27	2.83	0.00	0.04	2.90	0.50	3.02	6.8
3.55	5.5	0.27	2.32	0.00	0.04	2.30	0.50	2.35	6.9
4.60	5.7	0.75	2.16	0.32	0.00	3.60	0.50	4.13	8.2
5.00	6.0	1.26	2.81	0.32	0.00	3.20	0.50	3.82	8.4

BSRF:

--9 beam lines, 11 exp. stations

--2-3 months each year for SR

--applications:

condensed matter physics

material physics

life science

environment science

microelectronics

LIGA (*Micro-machine manufacture*)

...

2. plan for next few years

**Chinese government increased the running
budget of BEPC** (3M $\rightarrow$ 6M \$US)
per year

BEPC improvement:

- linac positron source
(to replace old one)
- beam diagnostics and control
system(improve)
- install feed back system (new)

BES improvement:

- read out electronic system
- magnet doors & endcap shower
counter

BSRF improvement:

- add two more insertion devices
(wiggler or undulator)
- E_{beam} from 2.2GeV $\uparrow$ 2.5GeV
- current 70 mA $\uparrow$ 100mA
- life time > 20 h.
- parasitic mode

R&D for TCF and BEPC II

--multiple-bench collision

--superconducting RF cavity

--high resolution calorimeter

budget: 10 M \$US approved (for 3 years)

physics:

*** collect $> 5 \times 10^7$ J/ψ events in 2000- 2001,**

$\xi(2230)$ and glueball, hybrid study

*** D physics, $\psi'' \rightarrow D\bar{D}$ at 3.77 GeV**

one year running (5 months)

**gives a factor 5 more $D\bar{D}$ data than
the present world level**

*** Ds physics**

at 4.3 GeV, 60 pb^{-1} sample one year,

a factor 3 increase of $Ds\bar{D}_s^*$

$Ds \rightarrow \mu\nu$, $Ds \rightarrow \phi\pi$, $Ds \rightarrow l\nu x$,

ψ' physics

will collect 1.5×10^7 ψ' events

ψ' , χ_c study

search for η' , 1P_1 states

3. further plans

*** τ -C-F ($L \sim 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$)**

--main physics goals

search for glueballs and hybrids

multi-quark states

D^0 - $\bar{D}^0$ mixing, R scan

signals beyond SM

--start R&D in machine, detector,

technical difficulties, prototype devices

--Monte Carlo study for physics processes

--with more realistic detector design

--special attention should be paid to:

**what are the advantages of TCF
compared with B-factories after 10
years**

--budget estimation : 2 billion Yuan

(~ 0.25 billion \$ US)

--BEPC will be used only for SR

--schedule:

decision will be made in 3-4 years

*** BEPC II**

--further upgrade of BEPC to

$$L \sim 5-10 \times 10^{31} \text{ cm}^{-2} \text{ s}^{-1}$$

--physics goals:

glueball search

hybrid search

τ -c physics

signals for new physics

R scan

--budget estimation:

400 million Yuan

(50 million \$ US)

* **decision will be made in 3-4 years**

* **non-accelerator physics**

--v-physics

Long base line experiment

**Solar ν or double β decay by
rare-earth element dopping**

--large scale array cosmic ray detector at

Yang Ba Jing (Tibet)

4300 M above sea level

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• * **international collaborations**

CMS, ATLAS, D0, HERA-B

Babar, Belle, KLOE

AMS, L3C, ICARUS, MINOS