The Operation of BEPC in 1999-2000

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Abstract

The task of BEPC in 1999-2003 is mainly to get 80 millions J/ψ data. This year has been succeeded to abtain 20 million J/ψ data which is required in schedule. This turn of BEPC' operation started in October 11,1999 and will end in July 1,2000. In this paper, the status of BEPC'operation will be described, which includes: the general description, recover for BEPC, Collision at the J/ψ energy, machine study, synchrotron radiation and, at last, conclusion.

General Description

BEPC'1999~2000 operation was started on October 4,1999 and will be finished in July 1,2000. Table 1 shows the schedule of this time's operation.

Table 1 the schedule of BEPC'1999~2000 operation

Period	Task
October 4 ,1999 ~ October 10,1999	Recover for BEPC
October 10,1999 ~ November 9,1999	Synchrotron Radiation
November 10,1999 ~ November 18,1999	Machine Study(MD)
November 19,1999~ March 19,2000	Collision for J/ψ
March 20,2000 ~ March 31,2000	Synchrotron Radiation
March 31,2000 ~ May 14,2000	Collision for J/ψ
May 15,2000 ~ May 31,2000	Machine Study
June 1,2000 ~ July 1, 2000	Synchrotron Radiation

It can be seen in Table 1 that the recover for BEPC was from October 4,1999 to October 12,1999, about 1 week . Then, we firstly began to perform Synchrotron Radiation for 1 month . The operation for synchrotron radiation has three separated period , which is satisfied the require of the user of synchrotron radiation .

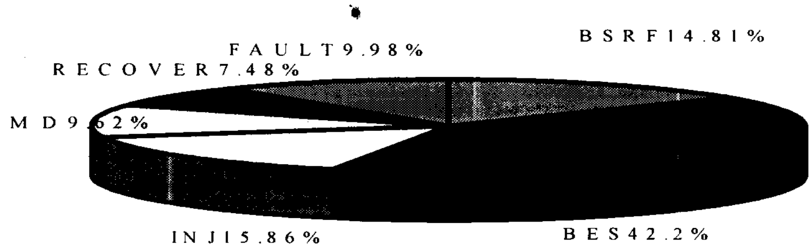

Fig. 1 The statistics of BEPC'1999~2000 operation.

Figure 1 displays the statistics of BEPC'1999-2000 operation. From October 4 ,1999 to May 28, 2000 the total operation time is 5712hrs, among which the recover for BEPC took up 7.48%, BES 42.2%, BSRF 14.81%, machine study 9.62%, injection 15.86%, and faults 9.98%.

Recover for BEPC

The time for recover at the beginning in this operation turn is very short, only about 1 week. The injection of electron was succeeded two hours later from begin. The formal three days is just used to recover the vacuum in the storing ring by mean of high beam current. The following days is to go through the mode for synchrotron radiation and e^+ & e^- collision. On the day of October 13, synchrotron radiation had been started with beam current 80mA. When the operation mode changed from synchrotron radiation to e^+ & e^- collision , the recover period is included in machine study. The total time for recover is 428 hours.

Collision at the J/ψ energy

One of the main task of BEPC in the last three years (including this year) is to get enough J/ψ data which will reach 80 million, and this operation turn is ready to obtain 20 million data. Since November 9,1999,BEPC turned to e^+ & e^- collision at the J/ψ energy 1.548Gev with the succeeded beam current ΣI=30mA. The collision experiment had to suspend for 2 week from December 10,1999 to December 22,1999 because of the BEPC linear vacuum fault. By and by, the collision beam current achieved 35 mA on January 12,2000 ,40mA on February 9,2000 and 43.4mA on March 29,2000 which is the maximum collision beam current in this operation turn. Table 2 shows the status of the e^+ & e^- collision on J/ψ energy in this turn.

Date	Beam current ΣI(mA)	e^+ & e^- energy(Gev)	Integral lum every shift(nb^{-1})*
11.19,1999~ 12.9,1999	30	1.548	24
12.23,1999~ 1.3,2000	30	1.548	30
1.4,2000~ 2.7,2000	35	1.548	45
2.8,2000~ 3.19,2000	40	1.548	60
3.31,2000~ 5.7,2000	40	1.548	60
5.8,2000~ 5.14,2000	65	1.843	100

Table 2 the status of BES in BEPC'1999~2000 operation
*every shift is 12 hours

At 18:45 on April 25, it is achieved to gain 20 million J/ψ data and finally gain 22.3 million J/ψ data at all. So the task of this turn is done very well.

Synchrotron Radiation

In this turn the synchrotron radiation has three period and last 2 months and 10 days, which is the longest time in every BEPC operation turn since BEPC built. The main reason is that BEPC is the only machine which can produce hard X-ray light and even higher energy light now, and the user who come to BEPC become more and more. In the first period prepared for two days, the beam current had achieved 80 mA at 2.2 Gev, and a week later the current reached 100 mA. In the second period for synchrotron radiation prepared only for three hours from collision mode ,the user of synchrotron radiation had used the beam. Now the third period for BESF have been lasting. It will run well in this period just as before. Table 3 shows the status of BSRF in this turn.

Date	beam current(mA)	Integral beam current very shift(mAhr)
10.10,1999~11.10,1999	80~115	600~1000
3.20,2000~3.31,2000	90~115	700~1000
6.1,2000~	80~	600~

Table 3 the status of BSRF

Machine study

We have spend much time on machine study as usually in this BEPC' operation turn, table 4 list some experiments done during the machine study.

Table 4 Some experiments done in BEPC'98 operation

- Optimize the collision mode
- Single interaction point experiment
- Multi-bunch scheme experiment
- Positron synchrotron radiation lifetime study
- Beam-beam interaction
- Beam based alignment
- RF feedback experiment

Since the last three years a main task of BEPC is to gain 80 million J/ψ data. optimization of collision mode is a very import part in machine study. We spent more than two weeks to improve the collision beam current which finally reached 43.4mA, very near to the limited beam current of the theory. At the same time the positron injection ratio achieved about 3mA/min, which is more quick than last year which is only about 0.8mA/min.

Fault

Some fault have been exit in this operation turn, the main fault list in table 5.

Table 5 main fault in this turn operation

- Vacuum leakage in linear part

- Water leakage in the transport line
- Vacuum leakage in injection point in the ring
- Instability of some power supply of the ring

The vacuum leakage cost most time of the whole fault time.The total time for the fault is 554 hours.

Conclusion

Though there are some fault in this time operation, we finished the task of this year well. Many improvement will be done after the later two years and the BEPC'operation will be done better year by year.

Acknowledgements

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References

[1]Y.Luo , status of BEPC'98 operation.