Test Beam Facility

1, An alteration of E2 Line for more applications

In 2005 year, the TBF performed BESIII sub-detectors beam test on the E3 line, and meet the commissioning of BEPCII-Linac. The LINAC first priority is injection into the BEPC main rings for BES and BSRF. For this reason the BTF test beam can be delivered in parasitic mode. In other words, when the injector linac to be upgraded with performance just as that was the TBF's has same improve. At present the main parameters of E1 and E2 line are listed in table 1.

Table 1 Parameters of E1 and E2 line

Electron/Positron Energy (GeV)	1.89/1.89
Current e/pulse	$10^{9\text{-}10}$
Emittance (μm/1σ)	0.1/0.31
Energy spread (%)	0.5/0.5
Macropulse rep. rates (Hz)	25-50
Pulse duration (ns)	1(FWHM)

Planed and required of application, the alteration of the E2 line be imperative under the situation, it is included as following.

(1) To extend the vacuum pipes of E2 line, this scheme is put forward that will enable to equip two target stations for reduce particle multiplicity, and that is requested by the flexible of experiments. As the follow fig 1, the real bremsstrahlung photons will be generated by the electrons impinging on a copper radiation target, located 550cm upstream from a production target, than the photons interact with second target that the teat particle for detector beam test was produced.

(2) To equipped the ion-chambers and Faraday Cup which use to measure the intensity of photons or electrons.

(3) To degrade the beam intensity on E2 Line for special application that will use a beam scraper, located 8m upstream from the B2. The intensity of $10^{3\text{-}10}$e/bunch is achievable on the E2 line.

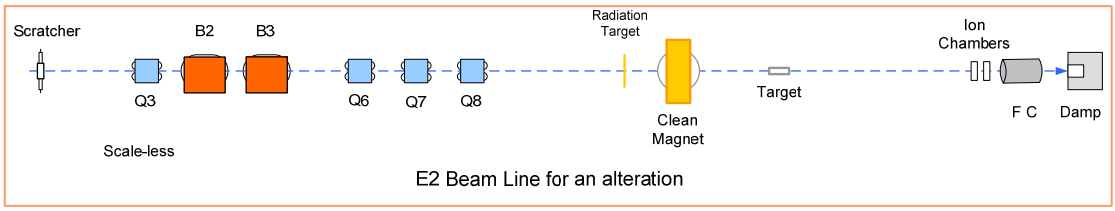

Fig. 1. Renewed configuration of E2 line

2, Electron beam Diagnostics

In 2006 year, the beam diagnosis equipments for electron beam position and intensity was equipped. The BPMs (Beam position Monitors) were designed to use the measurement of the beam position. A prototype for our first BPMs copied the BPM of the BEPCII-Linac. The BPMs framework is electron beam welded and it has four feedthroughs which are also welded to the BPM. The transmission line which is formed by the strip and external pipe of the BPM has on impedance of 50 Ω. The stripline length is 150mm. The angular width of the four electrodes is 60 degrees respectively. The calibration of the BPM will use the test-bench calibration system in the Accelerator Center.

The electron beam profile monitor for the electron beam calibration experiment will be fulfilled in the summer 2007. The adopted design consulted the parallel plate ionization chamber (PPIC) used in the Low Energy Antiproton Ring (LEAR) at CERN. The gas detector consists of an anode foil with two stripped cathode pads positioned on either side for X and Y beam profile measurement, and also to measure the beam intensity of 10^3-10^{10} electrons per pulse, two formations chambers were considered. In the chamber each cathode foil spaced from the anode by a 2.5 mm and 5cm gap respectively. The assembly is housed inside a vacuum chamber with Helium and P10 gas respectively. The XY resolution is 6 mm. The electronics is number of 9 channels each in the X and Y directions.

3, The plan of E3 Line upgrade

The new E3 line will be enhance Pion's intensity that the spectrometer will be shorten from 23m to 15m long, and also, which will extend the experiment area. The new magnetic spectrometer which is consisted of two dipole and two quadrupole magnets, three sets of hodoscopes H1-H3, a renewed Cherenkov counter, and a drift chamber for measuring double track separation. The hodoscopes will be used to reconstruct the particle trajectory for improve the momentum resolution of the spectrometer.