BEPCII TIMING SYSTEM

Ge Lei, Guanglei Xu, Gang Li, Lin Wang, Wenchun Gao

IHEP, Beijing, CHINA

Introduction

BEPCII continues to serve the purposes of both high energy physics experiments and synchrontron radiation applications. The accelerator consists of a 200 meter long linac, two transport lines for electron and position respectively, and two storage rings for colliding mode. These two rings are named as BER and BPR. Besides, a by-pass beamline is constructed at the north interaction region, to connect the two outer half rings of BER and BPR, to form the ring for synchrotron radiation, which is named as BSR. So altogether there are three storage rings to be commissioned.

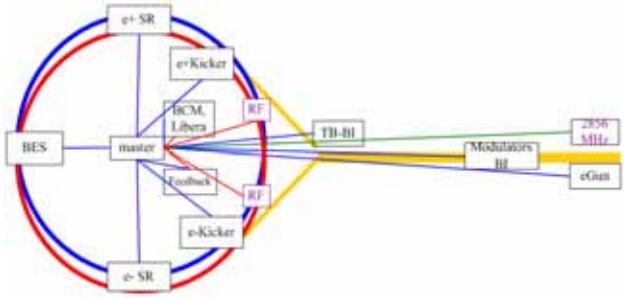
Timing related parameters

	Colliding mode	SR mode
Circumference	237.531m	241.129m
Energy	1.89GeV	2.5GeV
RF frequency	499.8MHz	
Harmonic number	396	402
Revolutions frequency	1.262MHz	1.243MHz
Linac RF frequency	2856MHz	
Linac repetition rate	5/3, 5, 12.5, 25, 50 (Hz)	

Tasks

- Triggers in linac repetition rate for :
  - electron gun, positron source
  - solid state amplifier and PSK,
  - 16 sets of modulators of klystrons,
  - e+ and e- injection kickers.
  - beam position monitors in linac, transport lines and the Libera BPMs in storage rings.
- Synchronizing clocks:
  - revolution clocks to
    - spectrometer (BESIII),
    - synchrotron radiation experimental stations,
    - transverse and longitudinal feedback BPMs,
    - trun-by-turn BPMs in storage rings.
  - 9.996MHz to linac BPM controllers
  - 99.96MHz to beam length measurements.
- Top-off injection control.
- Fast bucket selection in repetition rate
- Some interlocks among equipments.

Architecture



- BEPCII timing system is constructed based on EVG-200/EVR-200 of Micro-Research Finland Oy.
- 2 layers of fan-out from EVG to EVRs
- Gun-Tx for eGun timing, TD4v for kickers timing
- Special OTB developed for 200 meter long linac
- Special module for revolution frequency done
- Special record support of EPICS developed for fast bucket selection
- Top-off injection control development using SAD
- Some interlocks in timing system

Bucket selection

- EventClock = 499.8MHz / 5
- EventSequencerClock = EventClock/7
- Every bucket selectable from EVG
- Beam Instrumentation Group's BCM system measure currents of all buckets for 2 rings every 20ms, then timing system select the smallest bucket and fill in.

Top-off injection control