Abstract

Transverse bunch by bunch feedback system has been designed to cure the coupled bunch instabilities, caused by HOM, resistive wall or ions. The system has been constructed, tested and commissioned with beam. Preliminary studies show that the feedback system can suppress single bunch instability as well as coupled bunch instabilities. Mode analysis of the unstable coupled bunch motion reveals fast ion instability exist even at relative low current.

Cure instabilities

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- 10:30, with X/Y feedback loop closed. Single bunch current can be stored up to 6mA, limited by vacuum pressure alarm. Turn BxB feedback OFF, beam dropped to ~1mA.
- 13:40, filled ~20 bunches in one bunch train. With X/Y feedback loop closed, beam can be stored ~17mA, again limited by vacuum pressure.
- 14:40, bunch cleaning test to clean out selected bunches

44mA stored in ~1040 buckets

Ion effect

(Left) BPM X/Y TbT data from one of the storage ring BPM C30BPM1; (Right) BPM TbT data spectrum averaged from 180 BPMs, red traces were spectrum with bunch-by-bunch feedback OFF and blue traces with feedback ON

H₂ ion induced

Betatron sidebands suppressed with FB ON

Transfer function measurement

Components

Network analyzer measured amplitude and phase response, including high power amplifier, stripline kicker, Heliax cables and attenuator

Assembled kicker

30 cm plate

Ceramic

Bunch cleaning