Fermilab

(One Bump) Lattice Studies

Guan Hong Wu

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PURPOSE:

I have developed a method of measuring the lattice in the Main Ring using a series of closed orbit measurements taken with assorted 1-bumps around the ring. The data is fit using the MINUIT fitting package in a method similar to that used by Shekhar Shukla in the Booster. The Minuit package then performs a chi square fitting to the beta, phase, tune and kick strength.

This method has been tested on simulated data, but past measurements have had difficulties in real data. One of the problems with this method is it's inability to distinguish beta function errors and scaling errors of BPMs. One BPM in particular at VD27 appeared to have an error of 380%. The BPM specialist (Marvin Olson) was informed and recently replaced the RF module for this BPM. This study was to verify the finding, and to further study the effect of the BPM error. Also, it was intended to acquire 1-bump data under the condition that the lattice is changed notably by changing setting of one of the harmonic quadruples.

RESULTS:

Due to machine problems and higher priority of Tev studies, the beam time available to this study was less than 1.5 hour, and just enough to take one set of 1-bump data 3-bump data in the vertical D-section.

The data proved without doubt that the 380% BPM scaling error at VD27 was true before it's RF module replacement, and was indeed fixed afterwards. The shifting of fitting results disappeared. This will help understand and improve the '1-bump + Minuit' method. This also seems provide a good way to check BPM conditions.

The other data that we took are still being analyzed.