

## **Diagnostics Update of the Taiwan Light Source**

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wave lag about 30 seconds after P wave.

The SRF system trip happened 20

second after S wave arrived. The trip

was caused by the vibration of Nb cavity

which resulted in deformation of the

cavity and consequently provoked

resonance frequency shift.



## Abstract

Diagnostics of the 1.5 GeV Taiwan Light Source (TLS) has been continuously upgraded since 1993. The BPM electronics of the TLS have been upgraded to the Libera Brilliance in August 2008 to improve performance and functionality. Orbit feedback system is also migrated into fast orbit feedback system to enhance orbit stability. Commercial photon BPM electronics was tested recently. New generation bunch-bybunch feedback processor was tested to improve beam stability. Post-mortem diagnostic tools were also set up to clarify reasons of beam trip. These upgrades are contributed to improve beam quality and machine availability a lots. These efforts will be addressed in this report.

## New BPM System and Some Observation Delivery by the System



## New Orbit Feedback System

30 BPM ID

reduced to 0.2 µ m during

user mode for the vertical

plane.

- The commissioning of the new fast orbit feedback system has started from 2008.
- The reflective memory is employed to shares fast orbit data without consuming extra CPU resource.
- Libera Grouping is used to reduce Ethernet jitter.
- Pseudo-random binary sequence (PRBS) excitation is employed to measure system response and latency and then choosing the proper correctors for FOFB.
- The I/O latency time is around 500 msec. The computation latency is about 120 msec.
- Singular value decomposition (SVD) is used to invert response matrix. Tikhonov regularization is also adopted.
- The new FOFB is promoted to suppress noise of bandwidth to more than 50 Hz from old 6 Hz system after all components are upgraded. Increase loop bandwidth will be done after further study.









Testing of the iGp and Libera Bunch- by-Bunch are ongoing. Other diagnostic tools will be continuously added and built up to enhance system's reliability and availability.

Sequence of the earthquake and beam trip

- Photon BPM are testing.