Status of TLS and TPS Accelerators

NSRRC accelerator team: (left to right) Chang-Hor Kuo (team leader), Cheng-Chih Liang, Sam Fann, Chun-Shien Huang, Szu-Jung Huang, Tsung-Yu Lee, Wei-Yu Lin, Bo-Ying Chen, Hung-Chiao Chen, Yao-Kwang Lin, and Hsin-Hui Chen.

Table 1: Major parameters of the insertion devices installed in TLS

	W200	U50	U90	EPU56	SWLS	SW60	IASWA	IASWB	IASWC
Type	Hybrid	Hybrid	Hybrid	Pure	SC	SC	SC	SC	SC
Period (mm)	200	50	90	56	250	60	61	61	61
Photon energy (eV)	800–15k	60–1.5k	5–500	80–1.4k	2k–38k	5k–20k	5k–20k	5k–23k	5k–20k

Taiwan Light Source (TLS)

Operation Parameters

Tables 1 and 2 show the major operation parameters of the TLS storage ring and the associated insertion devices.

Table 2: Major operation parameters of the TLS storage ring

Beam energy [GeV]	1.5
Number of buckets	200
Beam current [mA]	360
Beam emittance ($\varepsilon_x/\varepsilon_y$) [nm-rad]	22 / 0.088
Betatron tune (ν_x/ν_y)	7.302 / 4.17
RF voltage [MV]	1.6
Beam lifetime [hour]	7

Operation Summary

The performance indicators for the TLS operation are shown in **Fig. 1**. The TLS has shown an outstanding performance in 2017. The beam availability is 98.5% with a scheduled user time of 4,669 hours. The mean time between failures (MTBF) reached a historical high, 259.4 hours. The beam stability also achieved 97.5%, the best ever.

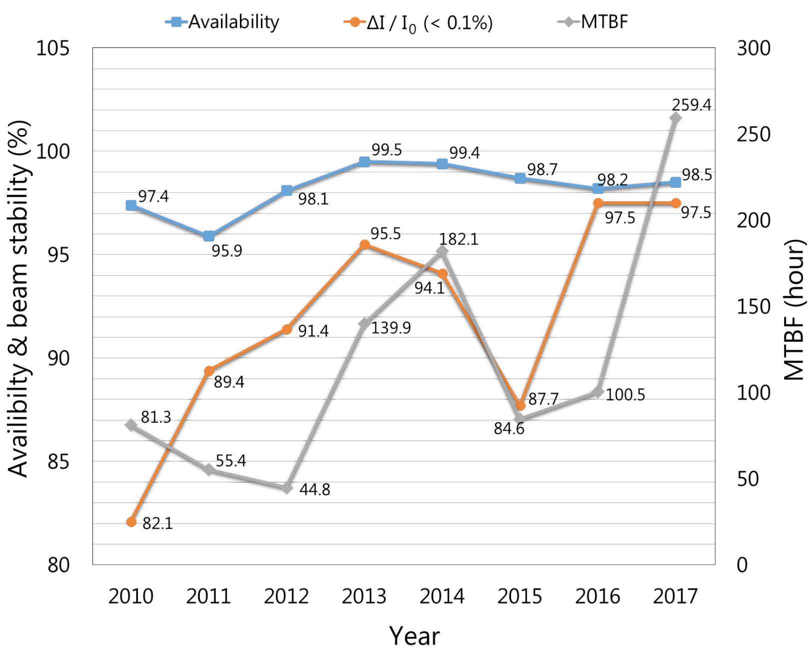

Fig. 1: The summary of the beam availability, beam stability ($\Delta I/I_0$) and MTBF of the TLS user-model operation.

Taiwan Photon Source (TPS)

Operation Parameters

The major operation parameters of the Taiwan Photon Source (TPS) are shown in **Table 3**.

Operation Summary

In 2017, totally 60 beam trip events occurred with a mean recovery time of 1.11 hours. The superconducting RF system contributed to the downtime of 40%, due to the gas loading issue. The summary of the beam availability and MTBF of the TPS user-model operation is shown in **Fig. 2**. (Reported by Chang-Hor Kuo)

Table 3: Major operation parameters of the TPS storage ring

Beam energy [GeV]	3.0
Circumference [m]	518.4
Number of buckets	864
Beam current (design) [mA]	400 (500)
Beam emittance ($\varepsilon_x/\varepsilon_y$) [nm-rad]	1.6 / 0.016
Betatron tune (ν_x/ν_y)	24.18 / 13.28
Natural chromaticity (ζ_x/ζ_y)	-75 / -26
Momentum compaction (α_1/α_2)	0.0024 / 0.0021
RF voltage [MV]	2.8
Synchrotron tune (ν_s)	5.42 x 10^{-3}

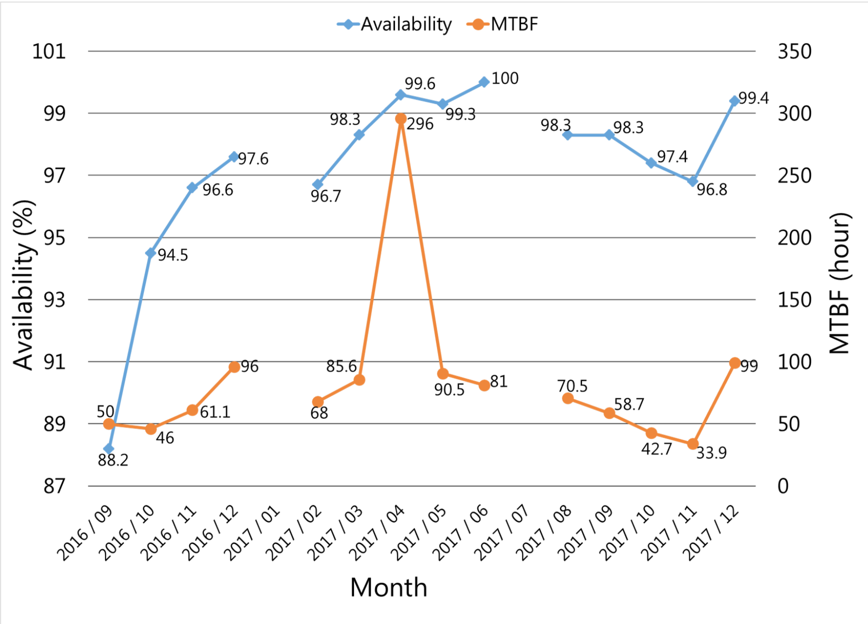

Fig. 2: The summary of the beam availability and MTBF of the TPS user-model operation.

The Rooftop Photovoltaic Systems at NSRRC

Facing deteriorating air quality issues and the availability of natural resources, renewable, clean sources of energy are getting more and more attention in recent years. This kind of energy does not produce greenhouse gases, helps distributed power generating systems, strengthen the nation energy security, and assist its long-term economic growth. For more than a decade, it becomes a trend for governments worldwide to set up the renewable energy promoting policies. Taiwan has no fossil fuel resources, so the development of renewable energy techniques and their application is always a high-priority policy of the government. Today, the renewable energy sources are only responsible for a few percent of the total energy consumed in Taiwan. Since 2016, the new government announced a new green energy policy that envisages the use of renewable energy to exceed 20% of the energy supply nationwide by 2025. It is definitely a tough challenge and requires more incentive measures to carry it out.

Among the renewable energy sources, solar panels have many advantages. They generate the electricity without carbon emission and ash/waste products, and require no input other than sunlight. It does NOT generate the radioactive waste or increases the environmental risks associated with nuclear power and there is no risk of groundwater pollution during processes like extraction of natural gas or other hydrocarbons. Furthermore, compared to all the other types of the power plants that generate the electricity via steam turbines, solar panels require little or even no water once installed.