Libera

# LIBERA PHOTON

*Peter Leban, Libera Workshop, April 2013, Solkan*

# Agenda

**Birth of the instrument**
**Evolution**
**Use cases**
**Conclusion**

# Birth of the instrument

Iteration with SOLEIL, NSLS-II and NSRRC

Make it compatible with various sensor types

Advance Libera (Brilliance) platform

Common synchronization procedure (Electron, Brilliance, Photon)

FOFB functionality

Emphasis on longterm stability, linearity

# Libera Photon

Uses 2 or 4 channels to calculate X/Y beam positions

3 position calculation equations

Compatible with Dectris sensors, blade-type XBPMs and ionization chambers

10 pA to 1.85 mA measurement range

Support for several ID gap settings with automatic scale parameter adjustment

Interlock and Postmortem functionalities

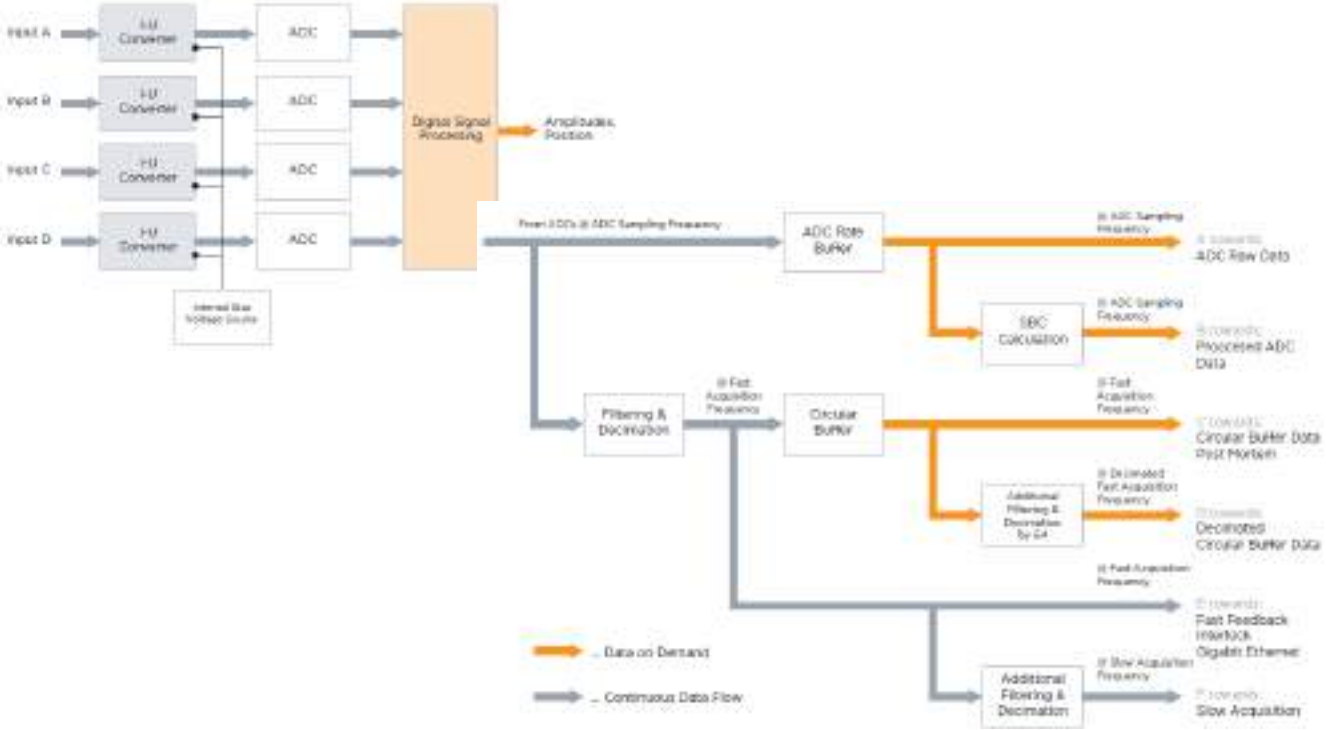
# Libera Photon – from input to output

current inputs

timing inputs, Interlock

Ethernet interface

Fast data links



# The evolution

Feedback from several labs: SOLEIL, DIAMOND, NSRRC, ELETTRA, CORNELL

Suggestions for improvements:

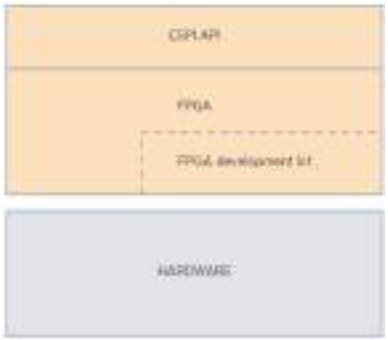
- Simplification of scale parameters' control
- Individual channel range setting ( towards the picoamperemeter functionality )
- Positive BIAS voltage source
- Reduction of A/D converter latency

… to name a few.

# Software and CS interface

**CSPI API is a high-level C interface which supports remote access and provides:**
Configuration
Data streams
Health monitoring
Event monitoring

**Provided to users with GNU GPL license and source code.**





**EPICS IOC and TANGO are widely used for managing the instrument from the control system.**

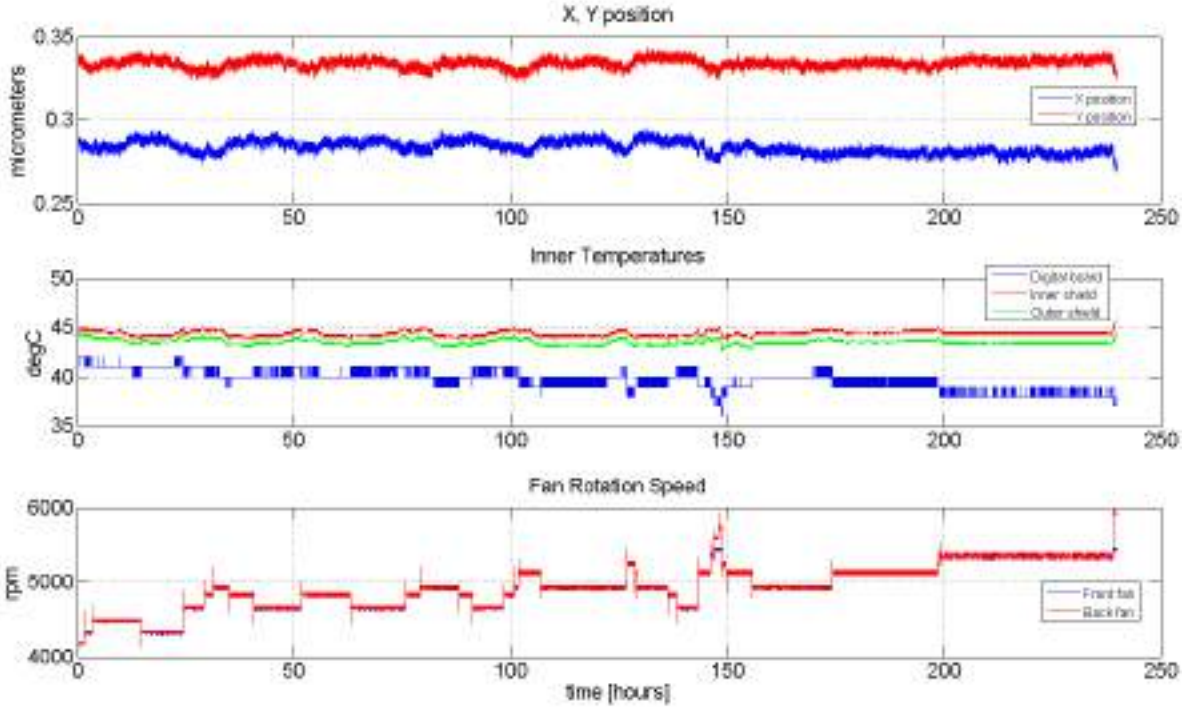
# Use cases

@laboratory
@SOLEIL
@NSRRC
@APS
@ELETTRA
@KEK-PF

@ANKA: 3 beamlines (Topo-Tomo, SUL-X and XAS)
@CLS, @SSRF and more

# Longterm stability test

10-day laboratory test
No temperature control
Simulated 1 µA current

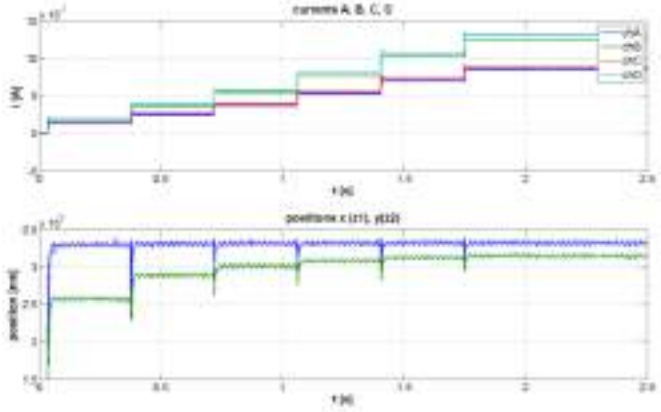


# @ SOLEIL

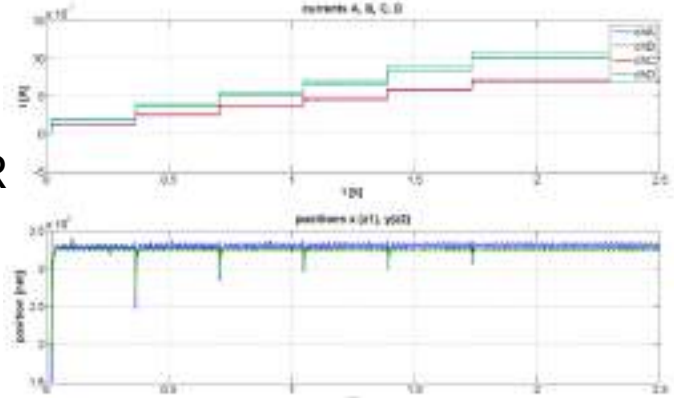
Several initial testings
First to test the FOFB functionality
Integration in the SOFB loop

Example of leakage (dark) current compensation

BEFORE



AFTER

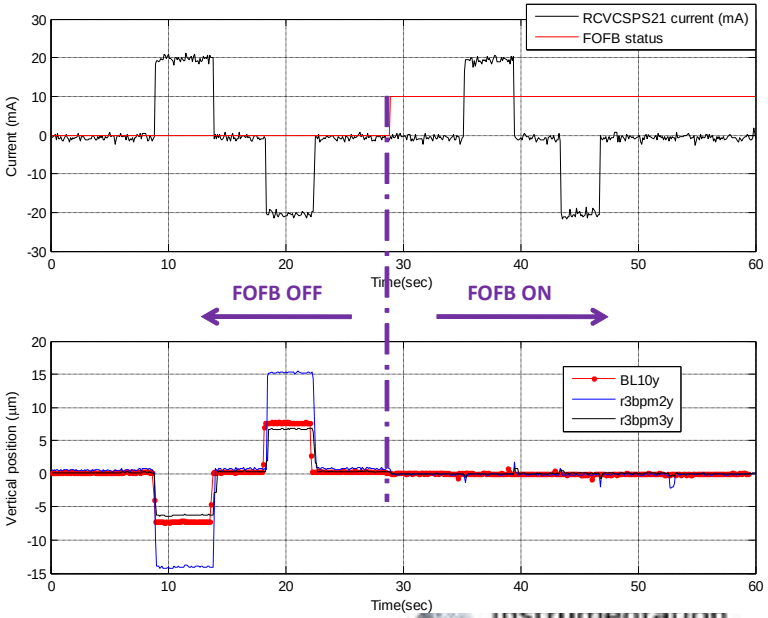


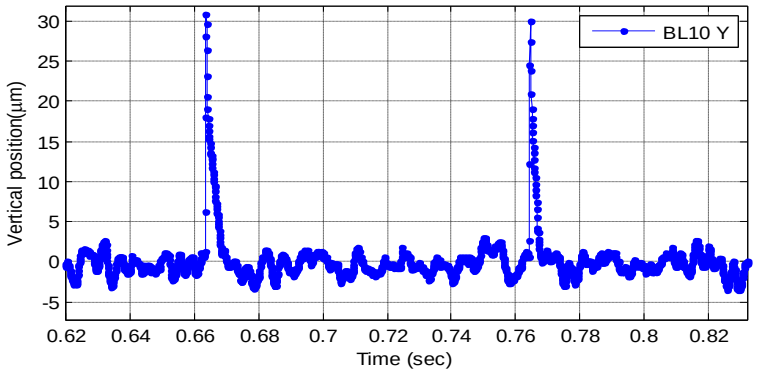
# @ Taiwan Light & Photon source

Tested in TLS for TPS

Several diagnostics done (FOFB, vibration)

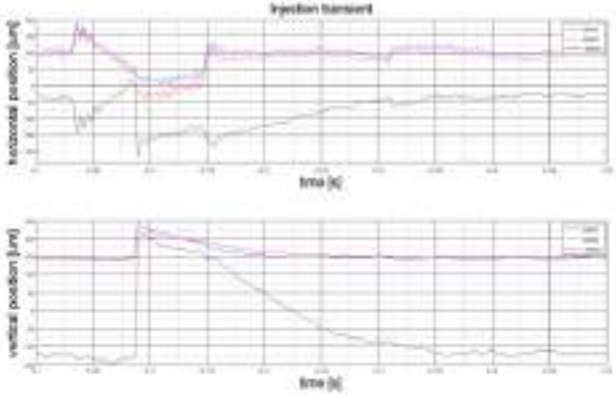
Injection study

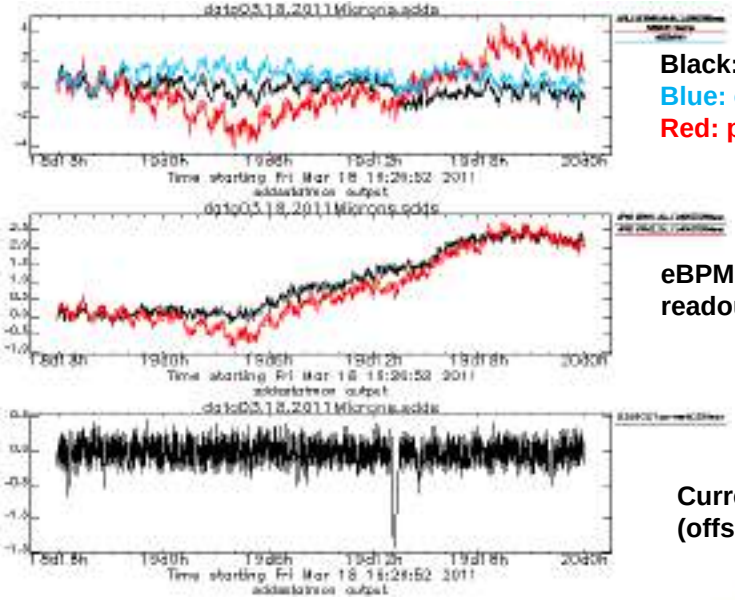


# @ APS

Injection analysis
Comparison with electron BPMs (Libera Brilliance+)




**Black: Libera Photon**
**Blue: other photon BPM**
**Red: projected position from eBPM**

**eBPM position readout**

**Current value (offset from 102 mA)**

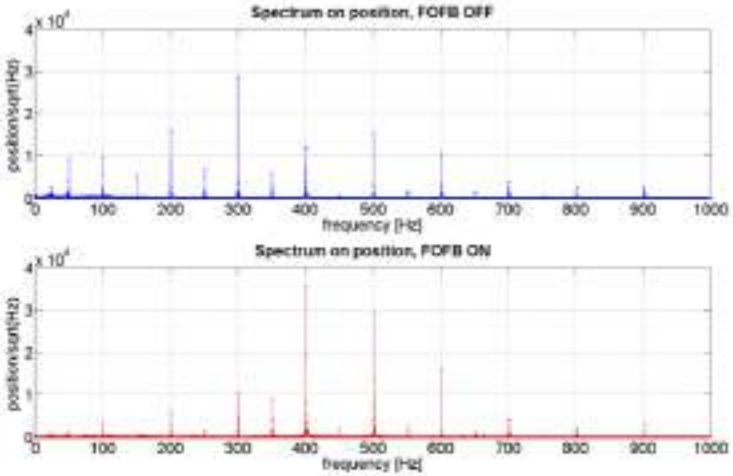


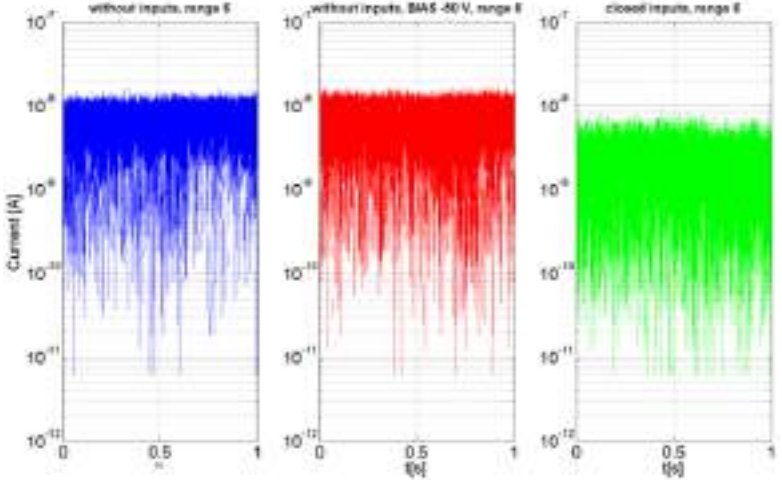
Instrumentation Technologies

# @ ELETTRA

Overall evaluation (comparison to in-house development)

FOFB effectiveness



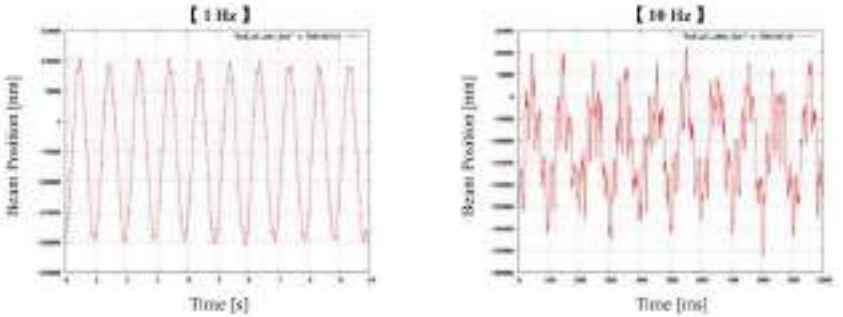

Electronic noise floor

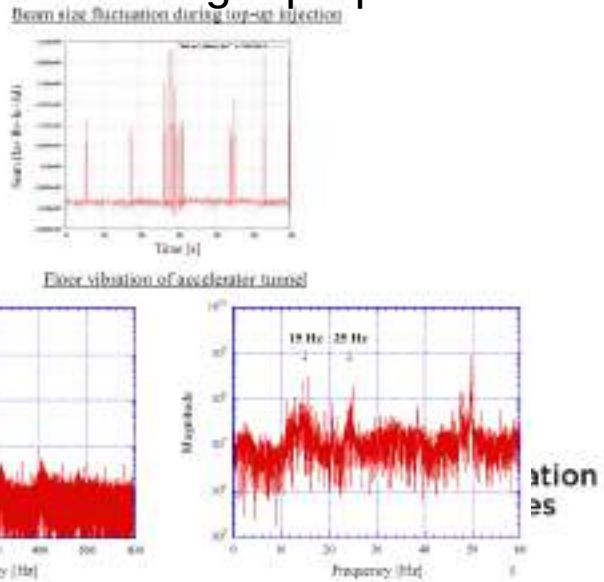


Instrumentation Technologies

# @ KEK Photon Factory

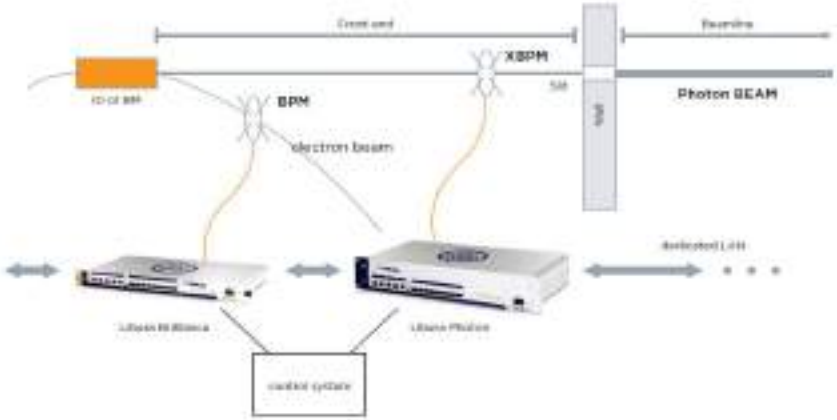
Use 2-channel configuration for BL4 and BL6 monitor heads
Observe photon beam position shaken at 1 Hz and 10 Hz
Observe leakage of local AC bump, beam size fluctuation during top-up injection and floor vibration of accelerator tunnel



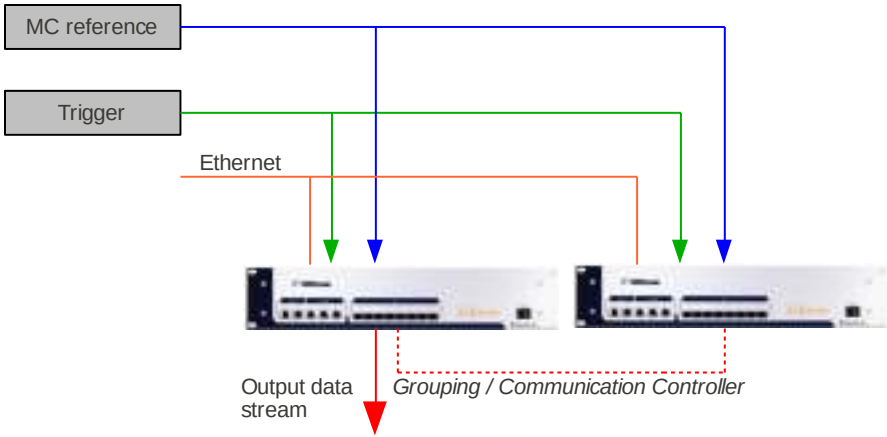



# Libera Photon – feedback options

## Global orbit feedback option




## Local beamline feedback option



# Conclusion

Simple to use, user-friendly functionalities

Can work as a basic picoamperemeter

Great longterm stability

Still, the platform offers additional simplification and addition of new functions

Works out-of-the box with no special preparation

# Thank you for your attention

**BTW, have you already heard about the anniversary discount? (50%)**