A revolutionary Beam Position Monitoring system

*Seven Solutions in association with F4E bring a complete solution for Beam Position Monitoring (**BPM**) used to provide information on the position, current and phase of the beam. An accurate and fully programmable solution powered by White-Rabbit synchronization and including high bandwidth communication make possible a precise beam position measurement never seen before.*

The technology

The BPM system provides to the Central Control System the variation of the beam centroid through different sensors alongside the accelerator line. The equipment provides measurement of the transverse position in X and Y, the longitudinal phase position, the relative beam current and time of flight calculations. The system operates in continuous and in pulsed mode and includes an autocalibration mode. Furthermore, the system provides a standard deviation <15um RMS in position and <0.9º RMS in phase at 0dBm.

Unprecedented analysis with programmable post-mortem

High Ethernet bandwidth and subnanosecond synchronization capabilities provided from a high stability, low noise White-Rabbit technology are used to develop a novel Datalogger for post-mortem analysis able to operate at rates up to 100 MHz. It offers a fully programmable trigger selection and libraries available in MATLAB, Python or CSS/BOY. This system makes possible distributed data analysis from multiple BPMs with outstanding temporal and spatial resolution, providing a level of observability of the beam never seen before.

A device that can be used with any kind of accelerator

This fully programmable solution could be universally implemented in any of the 30 000 accelerators existing worldwide, improving the overall operation of their systems, their timing distribution and accuracy. It uses EPICS as a control system and offers a customizable user friendly interface. Embedded widely used IT tools and Linux ensure easy operation and future maintainability .

Collaboration opportunities

The Beam Position Monitoring system has already been tested in particle accelerators including its integration with a low noise White-Rabbit network. The solution is now fully available and ready to be integrated and customised to specific needs and facilities, thanks to its modular and fully programmable implementation.

*Fusion for Energy
Email:
technologytransfer@f4e.europa.eu*