ID de Contribution: **112** Type: **Non spécifié**

# Anomaly detection and noise reduction in Turn by Turn BPMs signals of SuperKEKB main rings

*jeudi 21 novembre 2024 14:00 (25 minutes)*

SuperKEKB and the future circular colliders aim at luminosity as high as of $10^{35} cm^{-2} s^{-1}$. This requires very high beams current and very small beam sizes (nano-beams). In order to reach such beam sizes the accelerator physicist needs to control beam quality and accelerator optics. In particular, controlling even small linear and nonlinear effects that can perturb the optics is crucial. This is possible thanks to turn-by-turn Beam Position Monitors (BPM) signals. They allow us to reconstruct the optics parameters and to identify the presence of imperfections. Therefore, precise BPMs signal processing becomes increasingly important for present and future collider. Recent advancements in artificial intelligence (AI) and machine learning (ML) offer new methods to enhance the quality of BPM data, leading to better diagnostics and to results that are more accurate. Here we present an exploratory study of advanced AI techniques applied to superKEKB turn-by-turn BPMs data, aiming to detect faulty BPMs and reduce noise levels in their FFT spectra.

**Auteurs principaux:** M. GUELFANE, Abdelaziz (CentraleSupélec); DALENA, Barbara (IRFU); Prof. BUGIOTTI, Francesca (CentraleSupélec); CHERKAOUI, Ismail (CentraleSupélec); M. KPODJADAN, Jupiter-Seho (CentraleSupélec); BRUANT, Quentin (CEA/IRFU/DACM); GAUTARD, Valérie (CEA-Irfu); Mme ZUO, Yuxian (CentraleSupélec)

**Orateurs:** M. GUELFANE, Abdelaziz (CentraleSupélec); CHERKAOUI, Ismail (CentraleSupélec)

**Classification de Session:** ML for accelerators

**Classification de thématique:** Analysis : event classification, statistical analysis and inference, anomaly detection