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## **Model of a dynamic orbit correction system based on neural network in CLS**

*Wednesday, 10 May 2023 16:30 (2 hours)*

In CLS, Deep Learning was applied to make a dynamic model for the Orbit Correction System (OCS). The OCS consists of 48 sets of BPMs BERGOZ (96 data sheets with 900 Hz recording) that measure the beam position and use the SVD matrix to calculate the strength of the orbit correctors (48 sets of Orbit Correctors 'OC'). The Neural Network was built, trained, and tested using 96 BPM signals. Five layers of the network (Input Layer, Three Hidden Layers, and Output Layer) provide the time evolution of OC's signals (18 Hz), which can be achieved with high accuracy (Mean Square Error =  $10e-7$ ). The results are based on data collected during all challenging situations of the CLS storage ring's current beam position. An Arduino Board was used to test this methodology in real-time, and the time of operation was within the range of system timing (30 - 40 microseconds).

### **Funding Agency**

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

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