
Contribution ID: **56** Type: **Plenary**

# A Machine Learning based 3D Track Trigger for Belle II

*Wednesday 22 April 2020 14:40 (25 minutes)*

The Belle II experiment at the B-Factory SuperKEKB in Tsukuba, Japan performs precision tests of the standard model and searches for new physics. Due to the high luminosity and beam currents, Belle II faces severe rates of background tracks displaced from the collision region, which have to be rejected within the tight timing constraints of the first level trigger. To this end, a novel neural network z vertex trigger has been implemented on parallel FPGA hardware and integrated into the track trigger pipeline. Presently the results of a 2D Hough finder, which uses only the axial wire hits from the central drift chamber, are combined with stereo wire hits and drift-times to form the input for the robust neural network 3D track reconstruction. In this contribution a machine learning based 3D track finder is proposed, which improves the track finding efficiency by using the additional stereo wire hits in the preprocessing step for the neural network input. An experimentally optimized configuration of its parameters is presented and the benefits and impact on the neural network performance are evaluated on early Belle II data and simulated low multiplicity events.

## Consider for young scientist forum (Student or postdoc speaker)

Yes

## Second most appropriate track (if necessary)

Novel approaches and algorithms, and theoretical analysis

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**Session Classification:** Recording sessions