



Contribution ID: 65

Type: **not specified**

## **A Neural Network-based trigger for detecting ultra-high-energy neutrinos for RNO-G and IceCube-Gen2**

*Wednesday 12 June 2024 11:15 (30 minutes)*

Ultra-high-energy (UHE) neutrinos can be detected via radio antennas installed in polar ice sheets. In this work, we present a trigger system utilizing a convolutional neural network to process the antenna signals. This system can increase the neutrino detection rate by up to a factor of two at negligible additional costs, which would substantially advance UHE neutrino science. The trigger algorithm written in pure VHDL will be implemented in an existing digitizer hardware utilizing a 4-channel 500Msps flash ADC and a Cyclone V FPGA from Intel (Altera). Incoming data are processed in-flight by 45 DSP blocks, delivering trigger with a latency of a few clock cycles, thus meeting the main design requirement of low latency. We also present a relation between the clock speed and the power consumption, another critical factor. Finally, we give an outlook of new hardware development and expected performance gains from increased computing resources of more powerful FPGAs.

### **Talk's Q&A**

During the talk

### **Talk duration**

20'+10'

### **Will you be able to present in person?**

Yes

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**Session Classification:** Algorithm implementation

**Track Classification:** Algorithm implementation in HDL and HLS