



# Status of CDC trg neural-network

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# Status of Neural-Network

- Pipelined architecture for processing of data
  - Inputs to be calculated using TSF Hits and 2D Data
  - MLP calculates the estimation of z-Vertex
- Functionally complete and matching simulation results
- Latency
  - 100ns latency for processing with 200 MHz
- Resources (xc6vhx380 / UT3)
  - DSPs pretty much used up completely : 93 % Usage
  - BRAM : 57 % Usage ; SLICES : 48 % Usage

# Room for improvement

- Neural Network extension suggested by Sara
  - 127 neurons instead of 81 neurons in current setup
  - Better performance for estimation
  - About 6 additional clock cycles at 200 MHz
- 3D-Finder Preprocessing suggested by Sebastian
  - Possible upgrade
  - May need UT4 to be implemented
  - Studies of implementation effort

# Open Tasks

- Basically everything about integration
  - Only 2D connection with test pattern tested
  - 2D Input data
  - TSF Input data
  - ETF Input data
  - Output to next stage
  - Belle2Link / Slow Control / Data Quality Management
  - Probably more Interfaces and things that I forgot right now
  
- Bright side
  - So far some good feedback that we might get financing

# Summary

- Functional components implemented
  - Preprocessing and MLP
  - Precision close to offline computation
- Tested on smaller UT3 with loopback
  - Used simulated data stored in on chip memory
- Still room for improvement
  - Extension of neural network
  - Alternative preprocessing
- Integration to be done