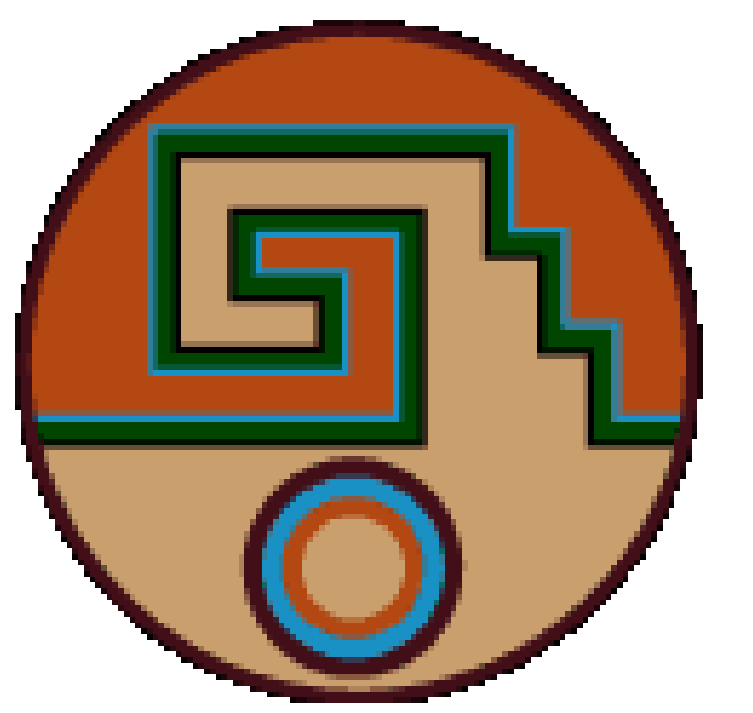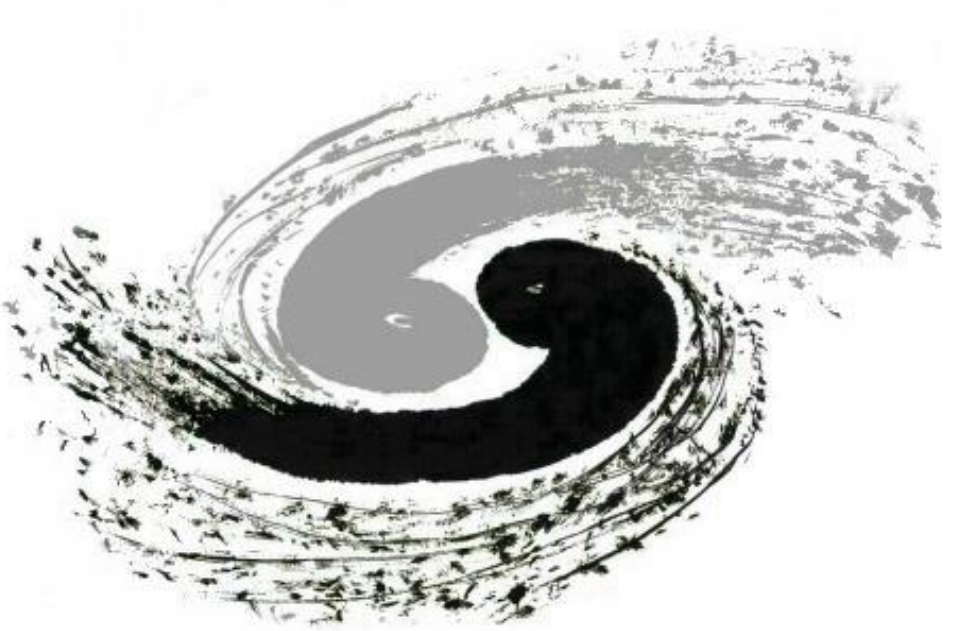# The performance profiling of ptycho-W1Net AI algorithm on DCU and HUAWEI NPU 910

Lei Wang, Yangyang Mu, Chengye Xing, Guangcai Chang, Jingyan Shi, Jiarui Hu, Yu Hu, Jianli Liu, Haokai Sun, Rui Liu, Shiyuan Fu, Fazhi Qi, Yaodong Cheng

Institute of High Energy Physics(IHEP), CAS

Why to Use DCU and Huawei NPU 910 for W1Net?

Ptycho-DM algorithm based on HEPS will generate more and more diffraction data

- The fourth generation of High Energy Photon Source higher X-ray throughput
- Eiger detector has higher resolution so the diffraction pattern data size is bigger
- Price of Nvidia GPU is getting higher so it is better choice to use DCU and Huawei NPU
- AI algorithm like ptychoNN is better to inverse problem than ePIE or DM iteration method
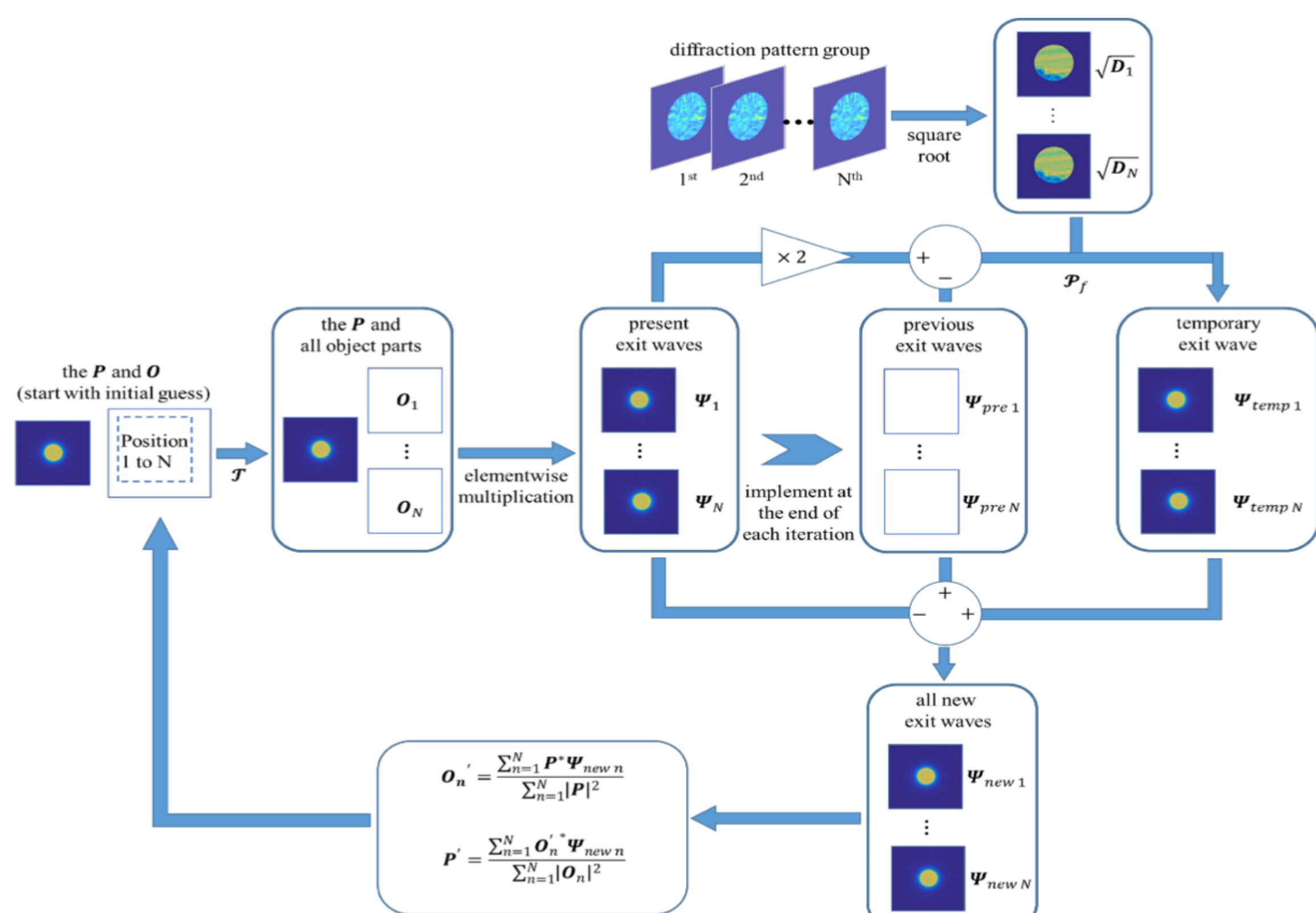
Details of W1-Net for ptychography reconstruction
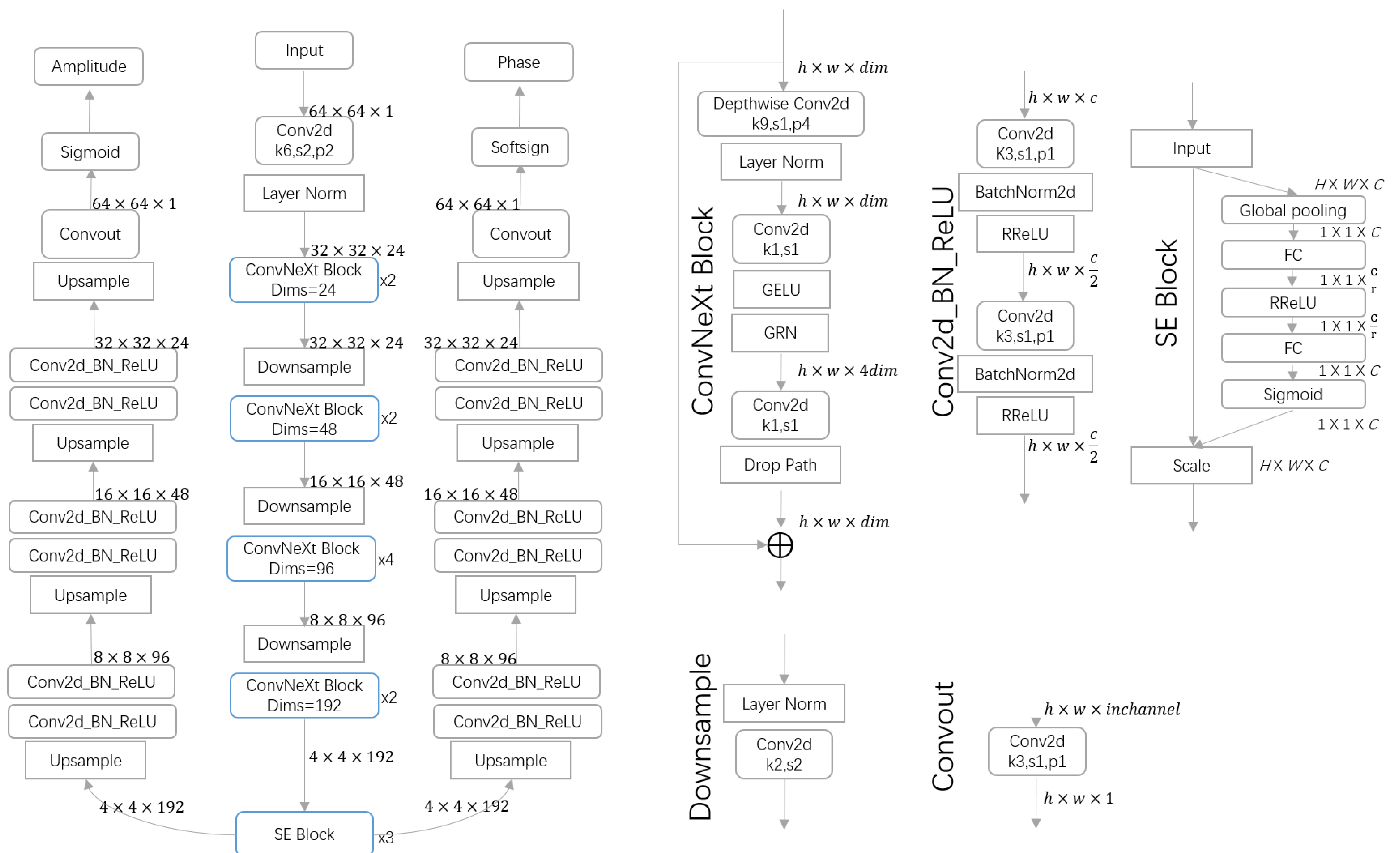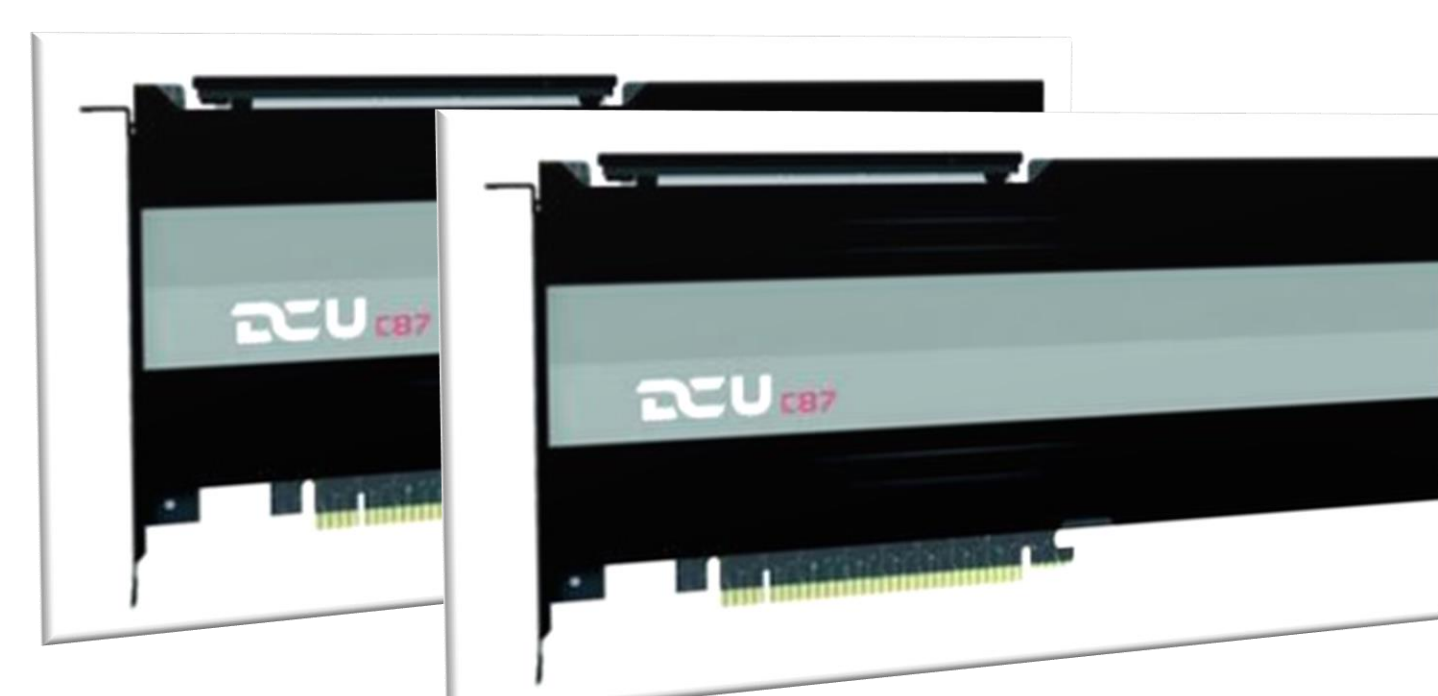

DM Iteration Method Overview

The difference mapping (DM) details

- Update the probe and object simultaneously
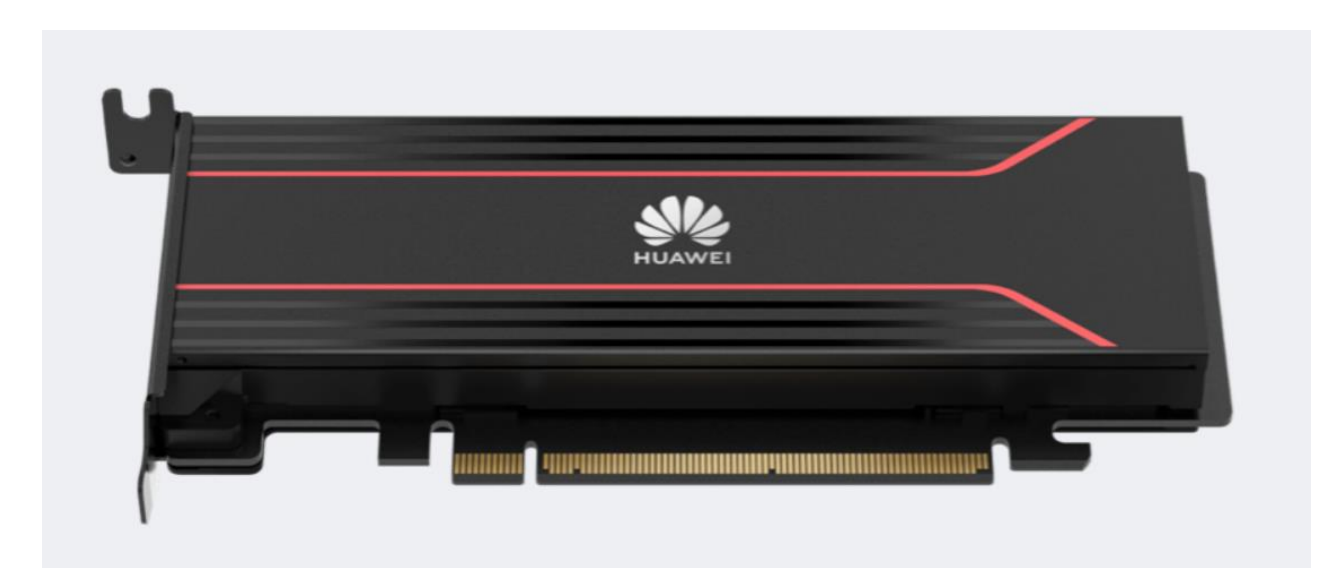- Allow for parallel computing, but SLOW

DCU and Huawei NPU 910

- Training on DCU is based on hipcc and Rocm during the process. Pytorch is optimized whose performance is 2/3 of A100.
- Training on Huawei NPU 910 is based on CANN and mindspore toolkit. Pytorch is developed by both Huawei and Pytorch team. 1/4 performance of A100.

DCU

Huawei 910