



Deep Learning for Bragg Coherent Diffraction Imaging: Detector Gap Inpainting and Phase Retrieval

Thesis

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INTRODUCTION

The present document is a draft of my PhD manuscript.

Part I

Bragg Coherent Diffraction Imaging

SINGLE CRYSTAL DIFFRACTION

PHASE PROBLEM

Part II

Convolutional Neural Networks

INTRODUCTION ON NEURAL NETWORKS

CONVOLUTIONAL

U-NET AND MSD-NET

Part III

Deep learning for Detector Gaps Inpainting

STATE OF THE ART

GAP INDUCED ARTIFACTS

MODEL DESIGN

PATCHING APPROACH

RESULTS IN DETECTOR SPACE

RESULTS IN REAL SPACE

FINE TUNING

PERFORMANCES ASSESSMENT

Part IV

Deep learning for Phase Retrieval

STATE OF THE ART

HIGHLY STRAINED CRYSTALS

RECIPROCAL SPACE PHASING

PHASE SYMMETRIES BREAKING

MODEL DESIGN

RESULTS ON 2D CASE

RESULTS ON 3D CASE

REFINEMENT WITH ITERATIVE ALGORITHMS

EXPERIMENTAL RESULTS

Part V

Conclusions

Annexes

APPENDIX