

Working Title: Reverse Design of Meta-surface Stacks via Neural Network

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1 Abstract

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Contents

1	Abstract	2
2	Physical Background	4
2.1	Meta Surfaces	4
2.2	The S-Matrix Formalism	4
2.3	SASA and the Star Product	4
2.4	Convolutional Neural Networks	4
3	The Algorithm	5
4	The Neural Network	6
5	The Optimizer	7
6	Results	8
7	Literaturverzeichnis	9
8	Anhang	10

2 Physical Background

2.1 Meta Surfaces

2.2 The S-Matrix Formalism

$$\hat{S} = \begin{pmatrix} \hat{T}^f & \hat{R}^b \\ \hat{R}^f & \hat{T}^b \end{pmatrix} \quad (1)$$

2.3 SASA and the Star Product

2.4 Convolutional Neural Networks

3 The Algorithm

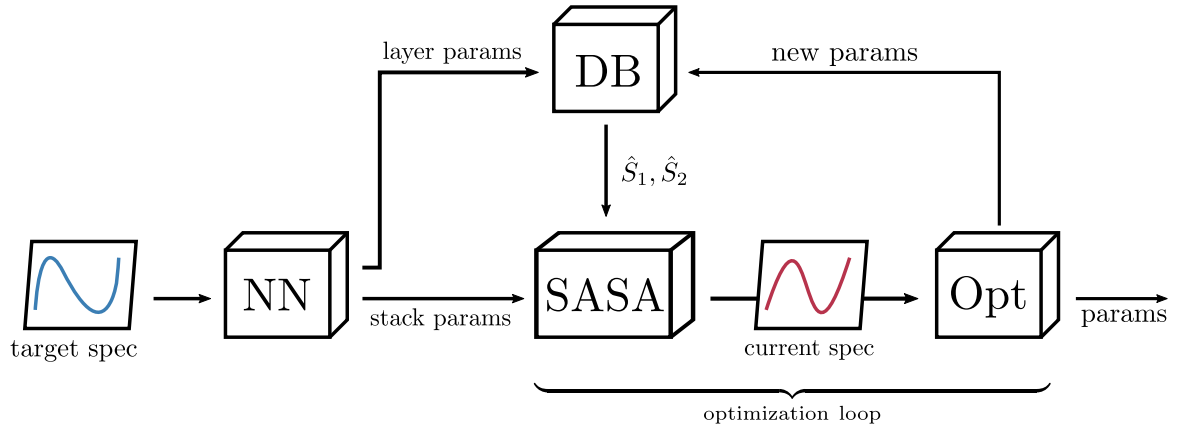


Figure 1: A Flowchart of the Algorithm

NN	convolutional neural ntwork trained to map spectra to stack and layer parameters
DB	database of FMM simulated single layers
SASA	algorithm calculating $\hat{S}_{\text{stack}} = \hat{S}_{\text{stack}}(\hat{S}_1, \hat{S}_2, \dots)$
Opt	optimizer changing parameters to minimize the difference between the current and target spectrum
\hat{S}_1, \hat{S}_2	S-matrices of the top and bottom layer
layer params	these include the geometry of the periodic meta surface cell and the kind of material used
stack params	the rotation angle of the layers to one another and the distance between
new params	the Opt. only changes the continuous parameters, the discrete ones , e.g. material, remain unchanged
optimization loop	this loop is repeated until the target accuracy is reached

4 The Neural Network

5 The Optimizer

6 Results

7 Literaturverzeichnis

sources.bib

8 Anhang