

# Natacha Kuete Meli

Curriculum vitae



## Objective

Dedicated and results-driven research scientist. Seeking to contribute to the research in the field of quantum computing, computer vision and image processing.

## Profile

Name: Natacha Kuete Meli  
Gender: Female  
Nationality: Cameroon  
Place of birth: Galim, Cameroon  
Country of residence: Germany, since October 2017  
Marital status: Single

## Contact

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## Language skills

**French**  
C2  
Mother tongue

**English**  
Good

**German**  
C1

## Programming skills

## DEGREES

2021–2024

### PhD in computational life science

UNIVERSITY OF LUEBECK · Germany

Thesis: Quantum Algorithms for Binary Problems with Applications to Image Processing.

Supervisor: Prof. Dr. Jan Lellmann.

Variational quantum circuits · QUBO/Ising models · Quantum annealing.

2018–2021

### Master in computational life science

UNIVERSITY OF LUEBECK · Germany

Thesis: Trainable Detection Methods for Industrial Materials Testing.

Supervisor: Prof. Dr. Jan Lellmann.

Object detection · image segmentation · deep learning · R-CNN · U-Net.

2012–2015

### Bachelor in mathematics and computer science

UNIVERSITY OF DSCHANG · Cameroon

Thesis: Backend Programming of a real estate web application in Java EE.

Supervisor: Prof. Maurice Tchoupe Tchendji.

Jave EE · HTML · PHP · UML.

## COMPETENCIES

### Quantum computing

- **Adiabatic quantum computing**

Modeling and discrete optimization · QUBO/Ising models · Quantum annealing.

- **Universal quantum computing**

Quantum circuits · variational quantum circuits · hybrid quantum algorithms

· approximate quantum algorithms.

### Image processing

- **Classical image processing**

Intensity transformations · morphological operations · principal component analysis · image reconstruction.

- **Image segmentation**

Active contour models · statistical shape models · atlas-based segmentation.

- **Image registration**

Parametric image registration · non-parametric image registration.

### Machine learning

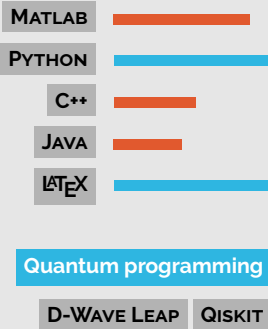
Image classification · object detection · image segmentation.

### Mathematics

Linear algebra · analysis · numerics · optimization · signal processing · image processing · graph theory · approximation theory · relativity theory · test and estimation theory · stochastic processes.

## RESEARCH INTEREST

I specialize in quantum computing's applications to image processing. This involves developing quantum algorithms for a range of image processing tasks, both combinatorial and non-combinatorial. Quantum computing offers a powerful solution to overcome challenges posed by non-convex energies, limited storage, and high computational demands, promising more accurate and cost-effective solutions for real-world image processing problems.



## TEACHING ACTIVITIES / SCIENTIFIC ASSISTANT

UNIVERSITY OF LUEBECK · Germany 📍

Responsible for creating exercise sheets and conducting student assessments to complement lectures in the following subjects:

<b>Quantum image processing</b>	Winter terms 2021, 2022 and 2023
<b>Optimization</b>	Summer terms 2022 and 2023
<b>Linear algebra</b>	Summer term 2021 and winter term 2023
<b>Seminar Numerical Optimization</b>	Winter terms 2021 and 2022
<b>Mathematical methods of image processing</b>	Winter term 2021
<b>Computer graphics</b>	Summer term 2020

UNIVERSITY OF LUEBECK · Germany 📍

Responsible for database maintenance, organization, and follow up of Erasmus applications as a scientific assistant at the International Office of the University of Luebeck.

Winter term 2019 - summer term 2021

## REVIEWING ACTIVITIES

Participated in the following events and conferences as a reviewer:

<b>QDSM 2023</b>	International workshop on quantum data science and management
<b>SSVM 2023</b>	International conference on scale space and variational methods in computer vision
<b>CVPR 2023</b>	IEEE/CVF conference on computer vision and pattern recognition
<b>BVM 2021</b>	Bilbverarbeitung für die Medizin

## CERTIFICATES

Continuously advancing my knowledge through online courses, I have earned the following certificates:

Sep. 2023

### **Qiskit global summer school 2023 - Quantum excellence**

IBM · Online 📍

For exploring the world of quantum computing through physics, math, and python via Qiskit, to bridge the gap between quantum theory and real-world implementation.

Quantum teleportation · iterative phase estimation · qiskit runtime.

Aug. 2023

### **QBronze**

QWORLD · Online 📍

For successfully completing the online training in Quantum Computing & Programming using QWorld's introductory tutorial Bronze-Qiskit in the Womanium Global Quantum Program.

Quantum entanglement · quantum search · quantum annealing.

Mai 2023

### **IBM Quantum Challenge: Spring 2023**

IBM · Online 📍

For understanding how to create circuits that perform mid-circuit measurements and dynamically decide what the next steps should be.

Dynamic circuits · phase estimation · Quantum teleportation · error correction.

## CONFERENCES

Presented research findings at the following conferences:

MIA 2023

### **Mathematics and Image Analysis**

BERLIN · Germany 📍

Poster: Iterative quantum transformation estimation.

CVPR 2022

### **Computer vision and pattern recognition**

NEW ORLEANS · USA 📍

Poster: An iterative quantum approach for transformation estimation from point sets.

### Research skills

Oral presentation



Literature review



Academic writing



Team work



Connect

#### Hobbys

Reading • Sewing clothes  
• Jogging • Watching  
documentaries on the  
universe

## STUDENTS

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Supervised final thesis of the following students:

Nov. 2023

**Josephine Elisabeth Oettinger (B.Sc.)**

UNIVERSITY OF LUEBECK · Germany 📍

Thesis: Non-Boolean quantum amplitude amplification for discret optimization.

Quantum search • Ising model • discrete optimization.

## VOLONTEER

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Worked on a voluntary basis on the following projects:

2022-2024

**Mentoring-programm CyberMentor Plus**

GERMANY · Online 📍

Provided online mentoring to an 8th-grade students while actively promoting science to schoolgirls. Served as a STEM role model and supported STEM projects that focused on understanding online shops, mandelbrot sets and digital images.

## PEER-REVIEWED PUBLICATIONS

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Authored or co-authored the following peer-reviewed publications:

- **Kuete Meli, N.**, Mannel, F. & Lellmann, J. A universal quantum algorithm for weighted maximum cut and Ising problems. Quantum Inf Process 22, 279 (2023). <https://doi.org/10.1007/s11128-023-04025-x>.
- **Kuete Meli, N.**, Mannel, F. & Lellmann, J. An iterative quantum approach for transformation estimation from point sets. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), pp. 529-537 (2022). <https://doi.org/10.1109/CVPR52688.2022.00061>.