

3rd Workshop on Quantum Computer Vision and Machine Learning

09.09.2026



Vladislav Golyanik



ECCV 2026 | MALMÖ | SEPT 8-12

QCVML Workshops

1st Edition: Quantum Annealing for Computer Vision

2nd Edition: Gate-based QC for Computer Vision and Machine Learning

3rd Edition: *Quantum-enhanced Representation Learning and Generative Models*

New this time:

- Tutorial on Quantum-enhanced Computer Vision by Natacha
- Talks from producers of gate-based quantum hardware (trapped-ion qubits)

QCVML Workshops

1st Edition: Quantum Annealing for Computer Vision

2nd Edition: Gate-based QC for Computer Vision and Machine Learning

3rd Edition: *Quantum-enhanced Representation Learning and Generative Models*

New this time:

- Tutorial on Quantum-enhanced Computer Vision by Natacha
- Talks from producers of gate-based quantum hardware (trapped-ion qubits)

Organisers:



**Frances
Yang**

PhD Candidate
AIML, Adelaide University



**Jan-Nico
Zaech**

Research Scientist
INSAIT



**Natacha
Kuete Meli**

Postdoctoral Researcher
University of Siegen



**Swagat
Kumar**

PhD Candidate
INSAIT



**Tolga
Birdal**

Assistant Professor
Imperial College London



**Vladislav
Golyanik**

Senior Research and
Acting Professor
MPI

Malmömässan D1 on Wednesday (1:20pm)

3rd Workshop on Quantum Computer Vision and Machine Learning



IT UNIVERSITY OF CPH



**Guilherme
N. DeSouza**
Associate Professor
University of Missouri



**Michael
Kastoryano**
Associate Professor
IT University of
Copenhagen



**Michele
Grossi**
Coordinator
CERN



**Natacha
Kuete Meli**
Postdoctoral Researcher
University of Siegen



**Marcel
Seelbach
Benkner**
Quantum Software
Engineer
eleQtron



**Fernando
Vilariño**
Associate Director and
Associate Professor
Computer Vision Center
Universitat Autònoma de
Barcelona



**Antonio
Andrea
Gentile**
Head of Unit
Pasqal



Why Attend?

- Learn QC from a computer vision perspective—no prior quantum background required
- Discover the latest progress in quantum generative AI, diffusion models, and hybrid quantum–classical learning
- Understand the capabilities and limitations of current quantum hardware
- Hear from leading researchers from academia, industry, and national laboratories
- Meet researchers working at the intersection of computer vision, machine learning, and QC

Today's Schedule



13²⁰	Opening Remarks and Organizer's Talk		▼
13³⁰	Tutorial on Quantum Computer Vision by Natacha Kuate Meli		▼
14³⁰	Invited talk by Marcel Seelbach Benkner and Eoin Potts	 	▼
15¹⁵	Coffee Break		▼
15³⁰	Invited talk by Antonio Andrea Gentile [REMOTE]		▼
16⁰⁰	Invited talk by Michele Grossi [REMOTE]		▼
16³⁰	Invited talk by Michael Kastoryano		▼
17⁰⁰	Invited talk by Fernando Vilariño		▼
17¹⁵	Invited talk by Guilherme N. DeSouza		▼
17³⁰	Panel Discussion and Closing Remarks		▼





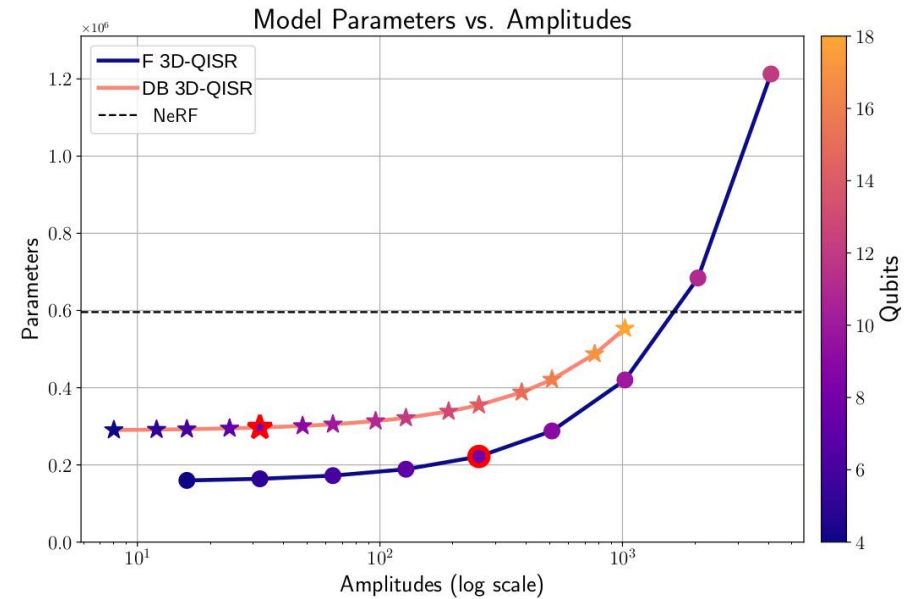
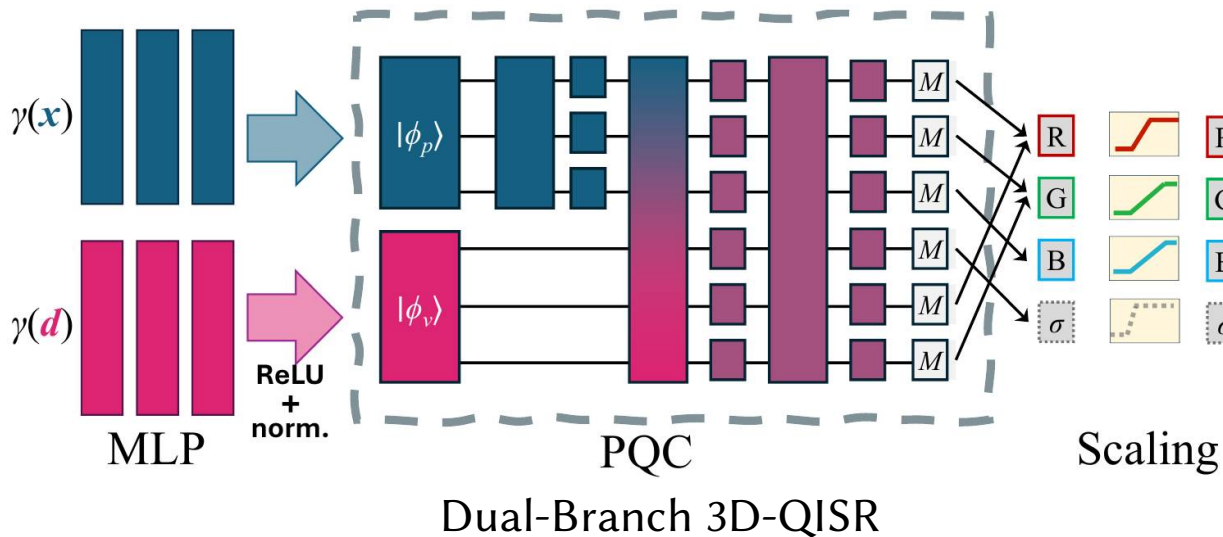
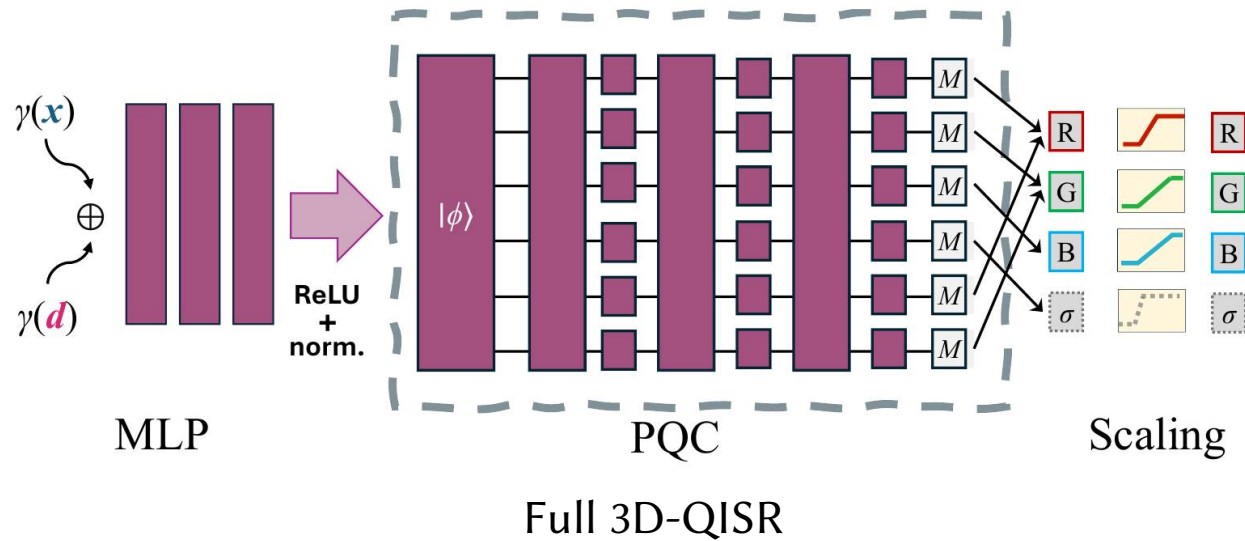
ground truth

NeRF, ECCV 2020

Full 3D-QISR

Dual-Branch 3D-QISR

3D Quantum Implicit Scene Representations



Qubits	Dual-Branch 3D-QISR		
	Amplitudes	Parameters (k)	Gates
4	8	290	21
6	16	293	42
8	32	297	70
10	64	305	105
12	128	322	147

Results at 800×800 px Resolution

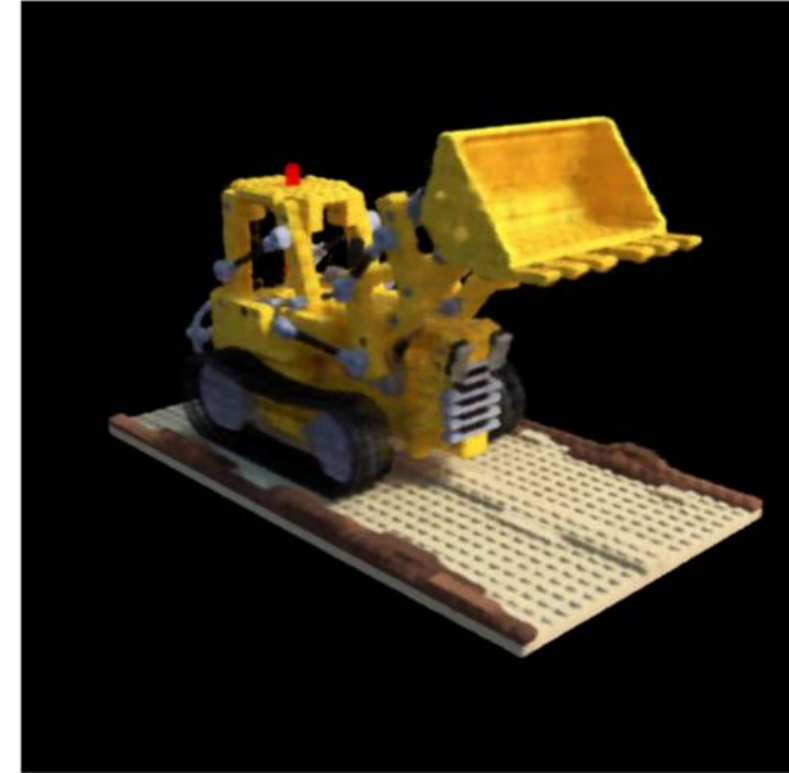
NeRF (24.57 dB)



Mip-NeRF (25.69 dB)



3D-QISR (26.13 dB)



Qualitative comparison on an example view of the *lego* scene at 800×800 pixel resolution (300k steps).

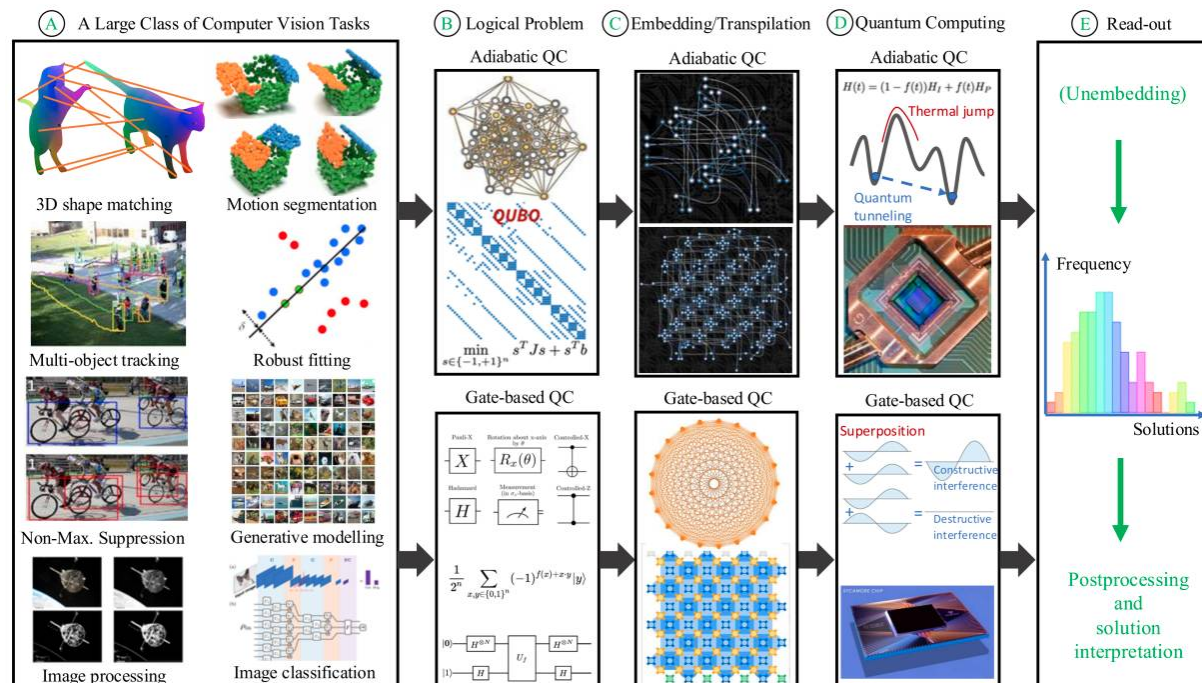
Comprehensive Survey on QeCV

Quantum-enhanced Computer Vision: Going Beyond Classical Algorithms

Natacha Kuete Meli¹ Shuteng Wang⁴ Marcel Seelbach Benkner¹ Michele Sasdelli²
Tat-Jun Chin² Tolga Birdal³ Michael Moeller¹ Vladislav Golyanik⁴
¹University of Siegen ²University of Adelaide ³Imperial College London ⁴MPI for Informatics

Abstract—Quantum-enhanced Computer Vision (QeCV) is a new research field at the intersection of computer vision, optimisation theory, machine learning and quantum computing. It has high potential to transform how visual signals are processed and interpreted with the help of quantum computing that leverages quantum-mechanical effects in computations inaccessible to classical (i.e. non-quantum) computers. In scenarios where existing non-quantum methods cannot find a solution in a reasonable time or compute only approximate solutions, quantum computers can provide, among others, advantages in terms of better time scalability for multiple problem classes. Parametrised quantum circuits can also become, in the long term, a considerable alternative to classical neural networks in computer vision. However, specialised and fundamentally new algorithms must be developed to enable compatibility with quantum hardware and unveil the potential of quantum computational paradigms in computer vision. This survey contributes to the existing literature on QeCV with a holistic review of this research field. It is designed as a quantum computing reference for the computer vision community, targeting computer vision students, scientists and readers with related backgrounds who want to familiarise themselves with QeCV. We provide a comprehensive introduction to QeCV, its specifics, and methodologies for formulations compatible with quantum hardware and QeCV methods, leveraging two main quantum computational paradigms, i.e. gate-based quantum computing and quantum annealing. We elaborate on the operational principles of quantum computers and the available tools to access, program and simulate them in the context of QeCV. Finally, we review existing quantum computing tools and learning materials and discuss aspects related to publishing and reviewing QeCV papers, open challenges and potential social implications.

Index Terms—Quantum-enhanced Computer Vision, Applied Quantum Computing, Quantum Algorithms.



Overview of computer vision problems that can benefit from universal (gate-based) or adiabatic quantum computers.

- *How to represent 2D images and 3D shapes for quantum NNs?*
- *What are QNN architectures tailored for visual computing?*
- *What is the native quantum generative model?*
- *How to scale-up quantum simulations and be able to do large-scale experiments?*

Moving on to the Tutorial...