MoSaiQC | ITN

Modular Systems for advanced integrated Quantum Clocks

D4.3 International Closing Symposium

Project acronym: MoSaiQC
Project full title: Modular Systems for Advanced Integrated Quantum Clocks
Grant agreement no.: 860579

Due Date:	Month 48
Delivery:	Month 48
Lead Partner:	UvA
Editor:	Florian Schreck, UvA Ineke Brouwer, UvA
Reviewer:	Alok Singh, BT
Dissemination Level:	PU
Status:	Final
Approved:	Yes
Version:	V1.0

DOCUMENT INFO

Date and version number	Author	Comments
v0.1, 18/12/2023	Ineke Brouwer, PM	Template Document
v0.2, 22/01/2024	Florian Schreck, UvA Ineke Brouwer, PM	First draft for internal review
v1.0 23/02/2024	Ineke Brouwer, PM	Final version after internal review

GLOSSARY

BT	British Telecom
D	Deliverable
DoA	Description of Action
ESR	Early Stage Researcher
PC	Project Coordinator
PM	Project Manager
RC	Research Committee
SB	Supervisory Board
TRC	Training and Recruitment Committee
UoB	University of Birmingham
UIBK	Universität Innsbruck
UvA	University of Amsterdam

Table of Contents

Executive summary

This document describes the MoSaiQC Closing Symposium entitled 'Versatile Cold Atoms: From Fundamental Physics to Applications' that took place at the University of Birmingham on January 17 and 18, 2024. The symposium was aimed at researchers from the research field of physics of cold atoms. In total, the symposium was attended by 51 people, of which 22 from within MoSaiQC (11 ESRs and 9 supervisors) and 29 attendees from outside MoSaiQC. The program of the symposium consisted of 8 scientific lectures delivered by experts from the field, as well as 3 short talks from MoSaiQC ESRs. In addition, there was a poster session where 13 junior researchers (of which 10 MoSaiQC ESRs) presented their work in a scientific poster. The main goals of the event was to provide training of the MoSaiQC ESRs into the field of cold atoms and to disseminate the scientific results of MoSaiQC to the scientific community.

In addition to the Closing Symposium, which was open to attend for anyone interested, a company visit to British Telecom took place on January 16, 2024 and MoSaiQC ESR and committee meetings took place on January 19, 2024 at the University of Birmingham.

1 List of contributors

Name	Organisation	Role
Ineke Brouwer	UvA	PM
Florian Schreck	UvA	PC

2 Introduction

In close collaboration with the University of Birmingham, MoSaiQC organized its closing symposium entitled 'Versatile Cold Atoms: From Fundamental Physics to Applications' that took place on January 17 and 18, 2024 at the University of Birmingham. The symposium was aimed at all researchers in fields related to cold atoms and optical clocks. Topics covered included ultracold molecules, quantum simulation, quantum applications, nuclear clocks and superradiance. The goal of the symposium was to provide the ESRs with a broader perspective of what possibilities are open to them in their future (through lectures from experts within the field) and to disseminate the results of the MoSaiQC project (through ESR presentations and a poster session).

3 Symposium Organisation

The symposium was organized by a scientific committee consisting of the following members:

- Prof. dr. Yeshpal Singh (supervisor, University of Birmingham)
- Prof. dr. Florian Schreck (PC, University of Amsterdam)
- Abhilash Jha (ESR, University of Birmingham)
- Balsant Tiwari (ESR, University of Birmingham)
- Yaneth Lavelle (Project Officer, University of Birmingham)
- Dr. Ineke Brouwer (PM, University of Amsterdam)

The company visit to British Telecom that took place on the day prior to the symposium was co-organized by Lakshmi Rajagopal (ESR).

4 Advertisement of the event

The symposium was advertised on a separate page of the MoSaiQC website (https://www.mosaiqc.eu/closing-symposium.html) as well as on MoSaiQC's social media channels and by emails within existing quantum research networks and consortia. At the University of Birmingham, the symposium was announced through posters.

The maximum capacity of 50 participants was reached on December 10, 2023, after which we were able to increase the maximum capacity to 55 participants.

Registration and details about the program were hosted on the webpage of the event (see **Appendix I**).

5 Symposium attendance

The symposium was attended by 51 people, of which 22 from within MoSaiQC (11 ESRs, 9 supervisors and 2 support personnel), 8 invited lecturers of which 1 MoSaiQC supervisor), 12 other attendees from the University of Birmingham (5 PhD students, 6 postdoctoral researchers and 1 professor) and 10 attendees from other institutes or organizations (4 PhD student, 1 postdoctoral researcher, 1 group leader and 4 industry participants).

For the full participant list, see **Appendix II**.

4 ESRs could not attend the symposium. This was due to various reasons. 1 ESR has already graduated, obtained his PhD degree and was in the US for his next career steps. 2 ESRs had other conferences/events to attend on the same dates. 1 ESR could neither travel nor participate online for medical reasons.

6 Symposium program

The program of the symposium consisted of scientific lectures, a poster session, and a social event/dinner for networking.

6.1 Scientific contributions

The scientific part of the program consisted of invited lectures, ESR presentations, and a poster session. The scientific lectures were chaired by MoSaiQC ESRs.

Invited lectures were delivered by:

- Prof. dr. Simon Cornish (Durham University) taught a lecture on full quantum control of ultracold polar molecules
- Prof. dr. Dmitry Budker (Helmholtz Institute) taught a lecture entitled “How big is your tabletop?” (Many ways to explore fundamental questions)
- Prof. dr. Helmut Ritsch (UIBK) taught a lecture on minimalistic nano-optical devices based on dipole coupled quantum emitter arrays
- Dr. Tarik Yefsah (École Normale Supérieure, Paris) taught a lecture on quantum simulation of fermionic matter
- Dr. Daniel Egger (IBM) taught a lecture entitled “Versatile Cold Atoms Quo Vadis: from atoms to bits to physics inspired computing & Quantum applications”
- Prof. dr. Ekkehard Peik (PTB) taught a lecture on nuclear clocks for testing fundamental physics
- Prof. dr. Michael Tarbutt (Imperial College London) taught a lecture on testing fundamental physics with ultracold molecules
- Prof. dr. Stefan Eriksson (Swansea University) taught a lecture on testing fundamental physics with precision measurements of antihydrogen

In addition, 3 ESRs presented their work in short talks:

- Anna Bychek (UIBK) presented her work on a superradiant two-level laser with intrinsic light force generated gain
- Abhilash Jha (UoB) presented his work towards the realisation of stationary optical lattice clock at UoB
- Digvijay (UvA) presented his work on a resonantly interacting mixture of Strontium and Rubidium

In addition to the lectures and short talks, there was a poster session where early-stage researchers both from within and from outside MoSaiQC presented their work in an informal setting. 13 posters were presented, of which 10 presented by MoSaiQC ESRs.

6.2 Other activities

On the evening of January 17, 2024 we organized a social activity, consisting of a visit to Warwick castle with a guided tour of the castle dungeons and the castle and a conference dinner. On the evening of January 18, 2024, we organized a MoSaiQC Consortium Dinner in the city of Birmingham.

6.3 Company visit to British Telecom on January 16, 2024

In addition to the symposium, the event was combined with a company visit to MoSaiQC partner British Telecom. This visit was for MoSaiQC ESRs and beneficiaries only. The purpose of the visit was to understand more about the research conducted at BT and insights into the demo, showcases and labs in BT.

The program of the visit was as follows:

9.00 Arrival
9.30 Presentation by Dr. Andrew Lord (Senior Manager, Optical and Quantum Networks Research)
10.15 Presentation by Carol Fletcher (Senior Manager, Academic and Research Partnerships)
10.30 Lab visits: Polaris
11.30 Lab visits: Robotics and Drone
12.30 Showcase visit
13.30 Lunch
15.00 Live Network Monitoring visit
16.30 Travel to Birmingham

6.4 MoSaiQC Meetings on January 19, 2024

Finally, on the day after the symposium, the MoSaiQC consortium took the opportunity of the fact that most consortium members had travelled to UoB to hold *in-person* meeting with ESRs, the SB, the TRC and the RC. Besides management topics, each ESR presented their progress within MoSaiQC and their future plans beyond the lifetime of MoSaiQC.

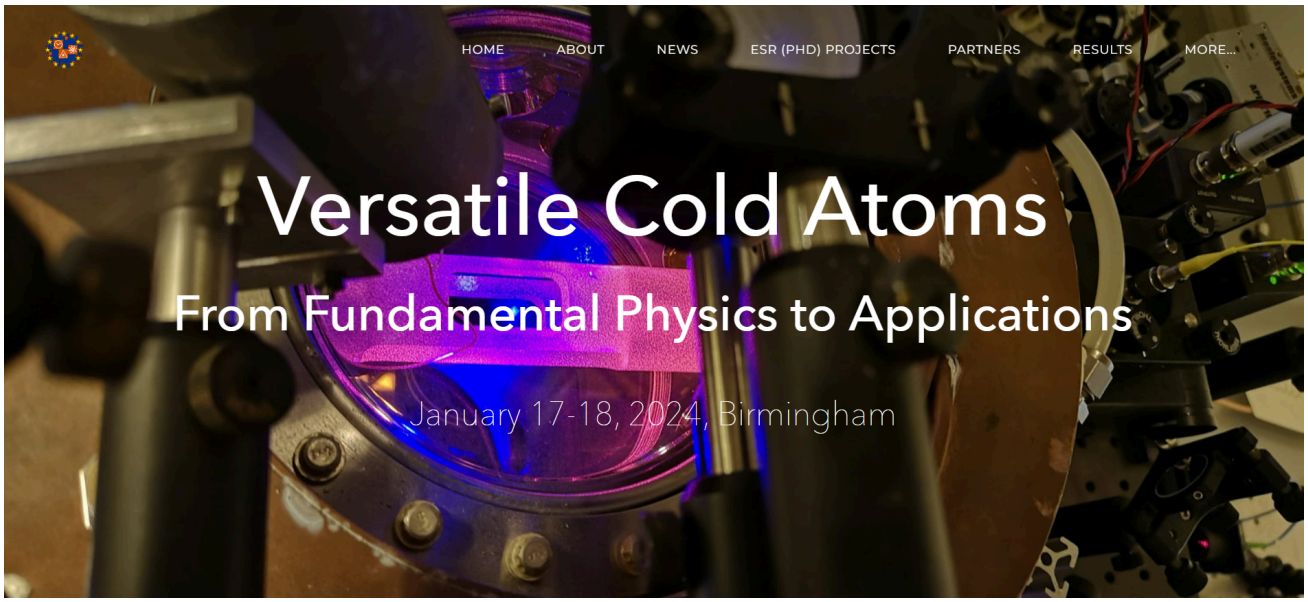
7 Deviations from the Description of the Action

The DoA defined the purpose of the Closing Symposium to be to disseminate the results of the MoSaiQC project. This goal was achieved through the short talks by MoSaiQC ESRs and the poser session, where ESRs presented their results.
In addition to what was described in the DoA, the event was used as an opportunity to provide training to the MoSaiQC network and beyond into the field of cold atoms, and to provide a networking opportunity for the MoSaiQC ESRs within the community.

8 Conclusions

The MoSaiQC Closing Symposium “Versatile Cold Atoms: From Fundamental Physics to Applications” that was organized by the MoSaiQC project at the University of Birmingham was successful both in training of the MoSaiQC ESRs (predominantly by means of lectures) and dissemination of MoSaiQC results (predominantly by means of the poster session and oral presentation) as well as providing a networking opportunity within the MoSaiQC project and the larger quantum community in which MoSaiQC is embedded.

9 Appendix I: event webpage

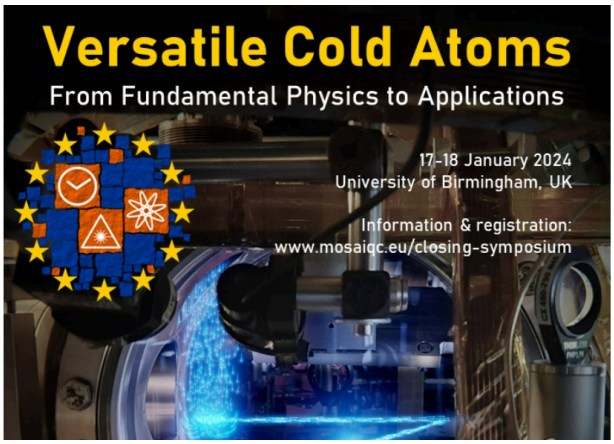


HOME ABOUT NEWS ESR (PHD) PROJECTS PARTNERS RESULTS MORE...

Versatile Cold Atoms: From Fundamental Physics to Applications

MoSaiQC Closing Symposium - January 17-18, 2024, University of Birmingham

The **MoSaiQC Closing Symposium** entitled **Versatile Cold Atoms: From Fundamental Physics to Applications** takes place at the **University of Birmingham** (UoB) on **Wednesday January 17** and **Thursday January 18, 2024**. This symposium is organised in light of the MoSaiQC project (www.mosaiqc.eu).



Location & Travel information:

Edgbaston Park Hotel (EPH)
53 Edgbaston Park Road, Birmingham B15 2RS United Kingdom
https://www.edgbastonparkhotel.com/

Hotel Reservations:

Please note that registration (see below) does **not** include a hotel

10 Appendix II: list of attendees

MSc	Digvijay	-	University of Amsterdam	MoSaiQC ESR
PhD	Anurag	Borah	The University of Birmingham	
MSc	Sana	Boughdachi	Toptica Photonics AG	MoSaiQC ESR
PhD	Dr Vincent	Boyer	University of Birmingham	
PhD	Andreas	Brodschelm	Toptica Photonics AG	MoSaiQC supervisor
PhD	Ineke	Brouwer	UvA	MoSaiQC PM

Prof. dr.	Dmitry	Budker	Helmholtz Institute, JGU Mainz and UC Berkeley	invited speaker
MSc	Anna	Bychek	University of Innsbruck	MoSaiQC ESR
Prof. dr.	Simon	Cornish	Durham University	invited speaker
PhD	Marion	Delehaye	FEMTO-ST	
MSc	Maxime	Dixmerias	Laboratoire Kastler Brossel	
MSc	Gwyn	Donlan	University of Birmingham	
MSc	swadheen	dubey	Atominstitut, TU Wien, Austria	MoSaiQC ESR
PhD	Daniel	Egger	IBM Research Europe	invited speaker
Prof. dr.	Stefan	Eriksson	Swansea University	invited speaker
MSc	Sandhya	Ganesh	University of Birmingham	MoSaiQC ESR
PhD	Darren	Griffiths	University of Birmingham	
MSc	Benedikt	Heizenreder	UvA	MoSaiQC ESR
MSc	Martin	Henriksen	NKT Photonics	
PhD	Yuheng	Huyan	University of Birmingham	
MSc	Abhilash	Jha	University of Birmingham	MoSaiQC ESR
PhD	Jithin	Kannanthara	University of Birmingham	
MSc	Mariame	Karzazi	University of Cambridge	
PhD	Georgy	Kazakov	TU Wien	MoSaiQC supervisor
PhD	Sumanta	Khan	The University of Birmingham	
	Yaneth	Lavelle	UoB - Project Officer	MoSaiQC support
PhD	Suman	Mondal	Research fellow	
PhD	Felix	Passmann	NKT-Photonics	
Prof. dr.	Ekkehard	Peik	PTB	invited speaker
MSc	Lakshmi	Rajagopal	Early Stage Researcher	MoSaiQC ESR
Prof. dr.	helmut	Ritsch	university of Innsbruck	MoSaiQC supervisor & invited speaker
MSc	Julian	Scheper	University of Cambridge	
Prof. dr.	Florian	Schreck	UvA	MoSaiQC supervisor
MSc	Arvind	Shekar	University of Southampton	
PhD	Alok	Singh	British Telecom	MoSaiQC supervisor
Prof. dr.	Yeshpal	Singh	University of Birmingham	MoSaiQC supervisor
PhD	Marc	Smillie	NKT Photonics	
PhD	Meg	Smith	University of Birmingham	
Prof. dr.	Prof Timothy	Softley	University of Birmingham	
MSc	Mariia	Stepanova	Menlo Systems GmbH	
Prof. dr.	Michael	Tarbutt	Imperial College London	invited speaker
MSc	Balsant Shivanand	Tiwari	University of Birmingham	MoSaiQC ESR
PhD	Poul	Varming	NKT Photonics A/S	MoSaiQC supervisor
MSc	Omid	Vartehparvar	Nicolaus Copernicus University (UMK)	MoSaiQC ESR

MSc	Jordan	Wayland	University of Birmingham	
PhD	Tarik	Yefsah	École Normale Supérieure (Paris) - CNRS	invited speaker
MSc	Ceren	Yuce	University of Birmingham	
MSc	Mehrdad	Zarei	Nicolaus Copernicus University	MoSaiQC ESR
Prof. dr.	Michał	Zawada	Nicolaus Copernicus University (UMK)	MoSaiQC supervisor
PhD	Shengnan	Zhang	University of Birmingham	MoSaiQC supervisor

11 Appendix III: symposium program

Wednesday, January 17, 2024

9.00-9.30 Registration

Session chair: Prof. dr. Yesphal Singh (University of Birmingham)

9.30-9.45 Welcome & introduction

9.45-10.30 **Prof. dr. Simon Cornish** – Durham University
Full quantum control of ultracold polar molecules

10.30-11.00 -- Coffee break –

Session chair: Anna Bychek (University of Innsbruck)

11.00-11.45 **Prof. dr. Dmitry Budker** – Helmholtz Institute
"How big is your tabletop?" (Many ways to explore fundamental questions)

11.45 -12.30 **Prof. dr. Helmut Ritsch** - Universität Innsbruck
Minimalistic nano-optical devices based on dipole coupled quantum emitter arrays

12.30-14.30 -- Lunch break –

13.30-14.30 Lab Tour

14.30-16.30 Poster Session and Industry Exposition

16.30 Visit to Warwick Castle for Tour and Dinner

Thursday, January 18, 2024

8.30-9.00 Registration

Session chair: Benedikt Heizenreder (University of Amsterdam)

9.00-9.45 **Dr. Tarik Yefsah** – École Normale Supérieure, Paris
Quantum Simulation of Fermionic Matter

9.45-10.30 **Dr. Daniel Egger** – IBM
Versatile Cold Atoms Quo Vadis: from atoms to bits to physics inspired computing & Quantum applications

10.30-11.00 -- Coffee break --

Session chair: Balsant Tiwari (University of Birmingham)

11.00-11.45 **Prof. dr. Ekkehard Peik** – PTB
Nuclear clocks for testing fundamental physics

11.45 -12.30 **Prof. dr. Michael Tarbutt** – Imperial College London
Testing fundamental physics with ultracold molecules

12.30-14.30 -- Lunch break –

Session chair: Abhilash Jha (University of Birmingham)

14.30 -15.15 **Prof. dr. Stefan Eriksson** – Swansea University
Testing fundamental physics with precision measurements of antihydrogen

15.15 -15.30 **Anna Bychek** – Universität Innsbruck
Superradiant two-level laser with intrinsic light force generated gain

15.30-16.00 -- Coffee break --

Session chair: Prof. dr. Florian Schreck (University of Amsterdam)

16.00-16.15 **Abhilash Jha** – University of Birmingham
Towards the realisation of stationary optical lattice clock at UoB

16.15 -16.30 **Digvijay** – University of Amsterdam
Resonantly interacting mixture of Strontium and Rubidium

16.30 Closing Remarks