

Call 2021 Final Evaluation

Website: <https://veriqtas.cft.edu.pl/>



VERIqTAS

*Verification of quantum
Technologies,
Applications and
Systems*

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COLLABORATION (overview)



GEOGRAPHICAL BREADTH

- Remigiusz Augusiak CTPAS (Warsaw) – **Coordinator**
- Antonio Acín ICFO (Barcelona)
- Miguel Navascués IQOQI (Vienna)
- Omar Fawzi INRIA, Lyon
- Laura Mančinská University of Copenhagen
- Stefano Pironio Free University of Brussels



VARIETY OF SECTORS, DISCIPLINES

- *quantum cryptography, quantum networks* (Acín, Fawzi, Pironio)
- *entanglement theory* (Acín, Augusiak, Navascues)
- *Bell nonlocality and self-testing* (Acín, Augusiak, Mančinská, Navascues, Pironio)
- *convex and numerical optimisation* (Acín, Fawzi, Navascues, Pironio)
- *many-body systems* (Acín, Augusiak, Navascues)
- *quantum computation, quantum complexity* (Mančinská, Navascues)



COLLABORATION (overview)



QUALITY OF COOPERATION

Meetings

- Consortium meeting – Warsaw, 6-7/06/2023 (~20 people)
- *Quantum Certification Conference (2023)*
 - Warsaw, 6-8/11/2023 (~80 people)
- *Quantum Certification Conference+ (2025)*
Warsaw, 12-14/05/2025 (~80 people)
- *Final VERIQTAS workshop* – Lyon, 23-25/03/2026 (~40 people)

Collaboration

- ICFO – CTP PAS (1 paper on self-testing in Nat. Comm.)
- ICFO – INRIA (1 manuscript)
- ULB – CTP PAS (3 manuscripts; 1 PRL and 1 Nat. Phys.)
- ICFO – UCPH (1 paper on randomness certification in Nat. Phys.)

QUACC (2023) 

<https://quacc2023.cft.edu.pl>

QUACC+ (2025) 



<https://veriqtas.github.io/>



INFRASTRUCTURE SHARING

No infrastructure sharing



SUCCESS STORY (highlights)



QuantERA Call 2021 Final
Evaluation

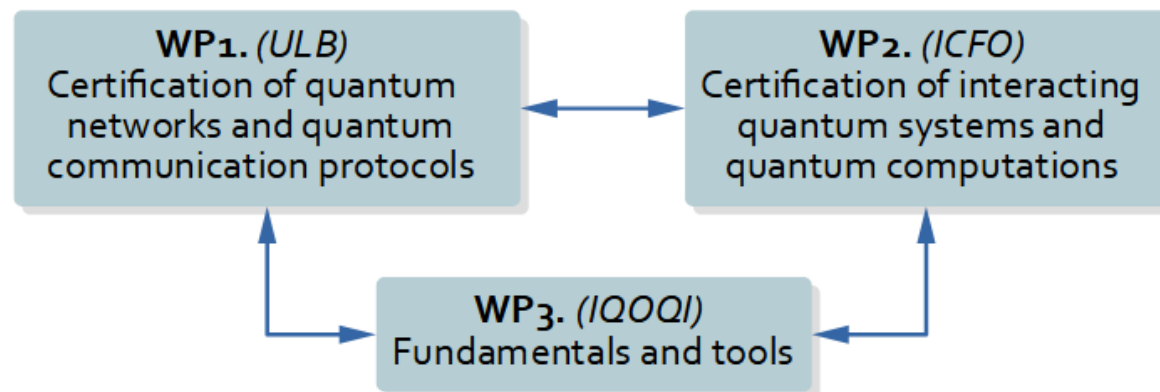


CHALLENGE

- In VERIQTAS we aim to develop versatile certification
- methods for quantum technologies that:
 - ✓ are experimentally friendly/based on minimal sets
 - ✓ of assumptions,
 - ✓ acknowledge limitations imposed by the devices,
 - ✓ rely on information that is easily accessible.



SOLUTION



SUCCESS STORY (highlights)



PLANNED AND SURPRISING/UNPLANNED OUTCOMES

- ✓ More than 70 publications
 - 4 Nat. Phys.
- ✓ More than 100 presentations
 - 4 Nat. Comm.
- ✓ 4 conferences and workshops
 - 3 PRX + PRX Quantum
- ✓ Numerous outreach and educational activities
 - 8 Phys. Rev. Lett.
- ✓ Training of your researchers (PhD's, Msc and BSC)



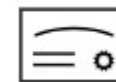
PUBLICATIONS AND PRESENTATIONS (highlights)

- ✓ [Self-testing of arbitrary real projective measurements in bipartite Bell scenarios](#) (Nat. Phys.)
- ✓ [Network-assisted certification of arbitrary multipartite entangled states](#) (Nat. Phys.)
- ✓ [A universal scheme to self-test any quantum state or measurement](#) (Nat. Phys.)
- ✓ [Certifiable bounds on relevant quantum properties of many-body ground states: corr. functions, structure functions, order parameters](#) (Phys. Rev. X)
- ✓ [All pure multipartite entangled states of qubits can be self-tested up to complex conjugation](#) (Nat. Comm.)



BACHELOR, MASTER AND PhD THESES

- ✓ 9 PhD students, 4 Master students, 1 Bachelor student



PATENTS

- ✓ 0 patents



IMPACT (RRI aspects)



QuantERA Call 2021 Final
Evaluation



GENDER

- 1/6 female PI
- All institutions introduced Gender Equality Plan
- Many other female researchers involved



OPEN SCIENCE

- All papers are posted on arXiv.org
- Many papers published in open-access journals (*Quantum*, *New J. Phys.*, *Nat. Comm.*)



SCIENCE EDUCATION, OUTREACH, PUBLIC ENGAGEMENT

26 activities

- Article "*Quantum Physics Falls Apart without Imaginary Numbers*" by M.-O. Renou, A. Acín, M. Navascués, *Scientific American* **328**, 62 (2023).
- Talk "*Self-testing large quantum systems*", international master class "*Quantum Learning Theory*", Aug 2023, Uni Copenhagen.
- Talk "*Conferència Cicle Nobels: Fotons entrellaçats*", Feb 2023, Hospitalet de Llobregat (Spain).
- MSc course "*Introduction to Quantum Computing*", Uni Copenhagen (since 2022).
- Mini-course "*Quantum Information Theory*" at the PCMI 2023 Graduate Summer School [\[link to YT\]](#)
- A short interview for Physics.org about the article *Nature Physics* 22, 446–451 (2026).
- German-Spanish science communication event "¿El tiempo es reversible? Presente y futuro de la física cuántica", The Cervantes Institute in Vienna, April 2024.



IMPACT (potential users)



COOPERATION WITH THE **QUANTUM FLAGSHIP** OR OTHER QUANTUM INITIATIVES (if applicable)

- ICFO and CTP PAS collaborated within the NeQST project (Hop-On) 
- CTP PAS, IQOQI and ICFO: QuantERA application (call 2025): CQ-MAYBE
- CTP PAS joins EQUALITY project QuantERA (call 2025) with no budget
- ICFO is partner in COMPUTE project within QuantERA (call 2023) 
- CTP PAS and ICFO: the project QEC4QEA within the European High Performance Computing Joint Undertaking (EuroHPC JU). 
- INRIA: funding from a CHIST-ERA project (MODIC) within the 2022 CHIST-ERA call
- CTP PAS: €2.5 million from the EU ERA Chairs program to establish a new research group dedicated to QT modeling. 
- CTP PAS: €30 million from the Teaming for Excellence program to transform the institute into a center of excellence in quantum technologies.





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