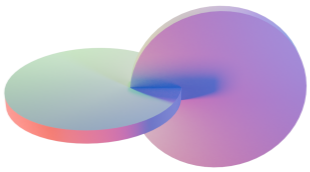

GIREP-EPEC
Transforming physics learning via Research & Practice
LEIDEN, 2025

Contribution ID: **264** Type: **Oral presentation**

Formal and informal approaches to quantum mechanics using quantum cryptography

Friday 4 July 2025 09:40 (20 minutes)

Quantum technologies rely on superposition and entanglement, concepts that challenge classical physics and provide a rich context for teaching. We developed a course for high school teachers that focused on quantum cryptography and used Thorlabs' educational equipment for hands-on learning. The course covered quantum mechanics, light polarization, and the BB84 quantum key distribution protocol through theoretical and experimental sessions. In addition, a card game was introduced as a public outreach tool to interactively perform the BB84 protocol. Feedback from teachers confirmed the feasibility of integrating these concepts into curricula to promote quantum literacy and engagement in secondary education.

Education level

Pre-service and in-service teacher education

Physics topic

Quantum mechanics

Research focus

Competence-based education

Research method

Educational design research (Qualitative research)

Organizing preference criteria

Physics topic

Author: BONDANI, Maria (CNR - Institute for Photonics and Nanotechnologies)

Co-author: DE RENZI, Valentina

Presenter: BONDANI, Maria (CNR - Institute for Photonics and Nanotechnologies)

Session Classification: Parallel oral presentations

Track Classification: Quantum education (QUANT)