



QuantumPUF: Applying Quantum Physics to Tackle Counterfeiting and Advance Secure Authentication

Lisbon, October 7, 2026 - Counterfeiting has become a global challenge with consequences far beyond fake luxury products. The global counterfeit market is estimated at €445 billion, around 2.5% of world trade, putting consumers at risk, undermining legitimate businesses and disrupting supply chains in sectors ranging from pharmaceuticals and food to toys, electronics and luxury goods. It is also linked to child labour and to unregulated, environmentally damaging manufacturing. Launched on September 1, 2026, with nearly €3 million from the European Innovation Council (EIC), QuantumPUF, whose consortium gathers today for its kick-off meeting, sets out to develop next-generation authentication technologies based on quantum and photonic principles.

A new generation of authentication

Current authentication technologies, such as digital fingerprints, QR codes, NFC chips and NFTs, are useful in many applications but not suitable for every use case, and they face growing challenges as cyber threats evolve. Quantum computing could undermine some of the cryptography that underpins them.

QuantumPUF aims to move beyond these limitations with Physical Unclonable Functions (PUFs) based on novel quantum and photonic technologies. PUFs use the unique physical characteristics of an object to create an identity that is extremely difficult to reproduce or clone. The project will design three classes of photonic PUFs (classical, quantum-readout and fully quantum PUFs) built on luminescent materials, produced with scalable techniques such as inkjet printing and read out with portable optical setups integrated into smartphones.

Security grounded in the laws of physics

At the heart of QuantumPUF is a radically new technological and methodological framework for authentication that can withstand emerging threats, offering:

- Strong protection against counterfeiting and cloning

- Resilience against side-channel and quantum attacks

- Low-cost and energy-efficient operation

- Portability across different applications

- Minimal environmental impact

- Reliable authentication for increasingly connected devices and systems

By combining physical principles with advanced cryptography, QuantumPUF seeks authentication mechanisms that are fundamentally harder to replicate than conventional digital identifiers.

Bringing together Europe's expertise

QuantumPUF brings together seven partners from Germany, Croatia, Portugal, Spain and Switzerland with leading expertise in photonics, materials science, quantum information and cryptography. Coordinated by Instituto de Telecomunicações, the consortium works at the intersection of fundamental research and technological development, aiming to turn high-risk research into real-world authentication solutions.

“The scale and sophistication of counterfeiting requires us to rethink how authenticity is established. QuantumPUF explores a fundamentally different approach: instead of relying solely on information that can potentially be copied, we are investigating how unique physical properties governed by the laws of physics can become the basis for secure authentication,” says Paulo André, QuantumPUF Project Coordinator at Instituto de Telecomunicações.

Towards a more trustworthy digital and physical world

As supply chains grow more complex and commerce moves online, trust in the authenticity of products, devices and information matters more than ever. QuantumPUF seeks to establish a new paradigm for authentication that is not only more secure, but also more sustainable, accessible and resilient to the threats of tomorrow.

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KEY FACTS

Full Name: PORTABLE READOUT QUANTUM PHYSICAL UNCLONABLE FUNCTIONS USING LUMINESCENT MATERIALS FOR AUTHENTICATION

Start date: September 1, 2026

Project duration: 48 months (September 2026 to August 2030)

Budget: €2,995,005 (100% EU funding)

Funding programme: Horizon Europe, European Innovation Council (EIC) Pathfinder Open

Grant Agreement No.: 101258015

Project Coordinator: Instituto de Telecomunicações (IT), Portugal

Website:

Social media:

PROJECT PARTNERS:

Germany:

HUMBOLDT-UNIVERSITAET ZU BERLIN

Croatia:

RESEARCH AND INNOVATION SERVICES DOO (RISE)

Portugal:

INSTITUTO DE TELECOMUNICACOES (project coordinator)

PROPOSTA FIGURADA, UNIPESSOAL LDA

UNIVERSIDADE DE AVEIRO

Spain:

UNIVERSIDAD DE VIGO

Switzerland:

UNIVERSITE DE GENEVE

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