IEEE SA
STANDARDS ASSOCIATION

QUANTUM TECHNOLOGIES

CURRENT QUANTUM STANDARDS EFFORTS

Jonathan J. Attia

StandICT.eu

Zoom – Oct 13, 2022

IEEE

IEEE SOCIETIES & STANDARDS DEVELOPMENT

1. Aerospace and Electronic Systems Society
2. Antennas and Propagation Society
3. Broadcast Technology Society
4. Circuits and Systems Society
5. Communications Society
6. Computational Intelligence Society
7. Computer Society
8. Consumer Technology Society
9. Control Systems Society
10. Dielectrics and Electrical Insulation Society
11. Education Society
12. Electromagnetic Compatibility Society
13. Electron Devices Society
14. Electronics Packaging Society
15. Engineering in Medicine and Biology Society
16. Geoscience and Remote Sensing Society
17. Industrial Electronics Society
18. Industry Applications Society
19. Information Theory Society
20. Instrumentation and Measurement Society
21. Intelligent Transportation Systems Society
22. Magnetics Society
23. Microwave Theory and Technology Society
24. Nuclear and Plasma Sciences Society
25. Oceanic Engineering Society
26. Photonics Society
27. Power Electronics Society
28. Power & Energy Society
29. Product Safety Engineering Society
30. Professional Communication Society
31. Reliability Society
32. Robotics and Automation Society
33. Signal Processing Society
34. Society on Social Implications of Technology
35. Solid-State Circuits Society
36. Systems, Man, and Cybernetics Society
37. Technology and Engineering Management Society
38. Ultrasonics, Ferroelectrics, and Frequency Control Society
39. Vehicular Technology Society

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IEEE ComSoc
IEEE Communications Society

IEEE COMPUTER SOCIETY

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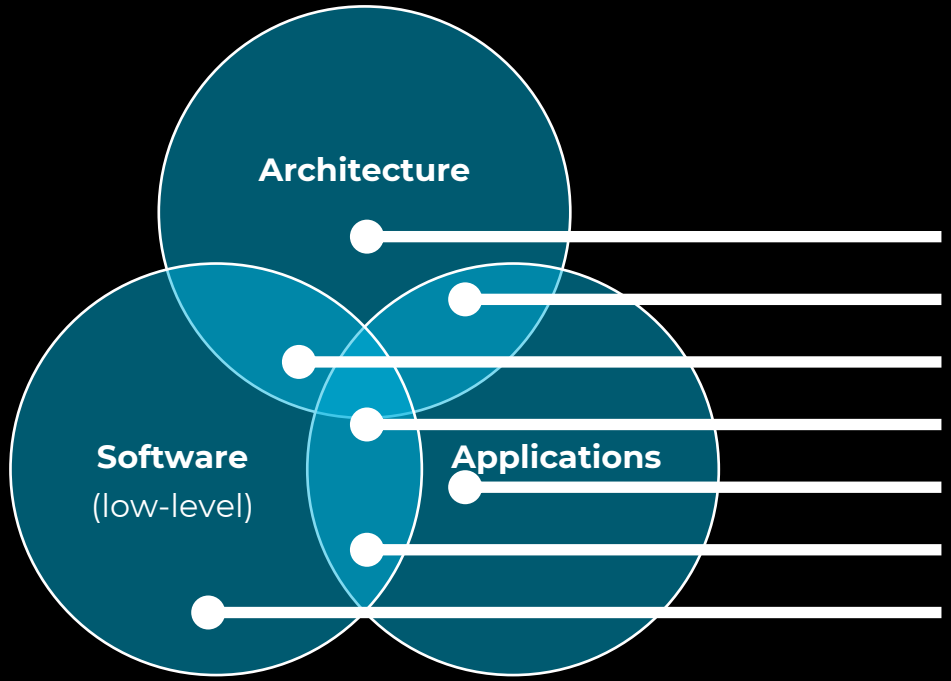
In the coming years

(QUANTUM) STANDARDS & TRLs

Strategies



QUANTUM STANDARDS EFFORTS

IEEE ComSoc	P1913	- Software-Defined Quantum Communication
IEEE ComSoc	P1943	- Standard for Post-Quantum Network Security
IEEE Computer Society	P2995	- Trial-Use Standard for a Quantum Algorithm Design and Development
IEEE Computer Society	P3120	- Standard for Quantum Computing Architecture
IEEE Nanotechnology Council	P3155	- Standard for Programmable Quantum Simulator
IEEE Computer Society	P3172	- Recommended Practice for Post-Quantum Cryptography Migration
IEEE Computer Society	P7130	- Standard for Quantum Computing Definitions
IEEE Computer Society	P7131	- Standard for Quantum Computing Performance Metrics & Performance Benchmarking

IEEE STANDARDS

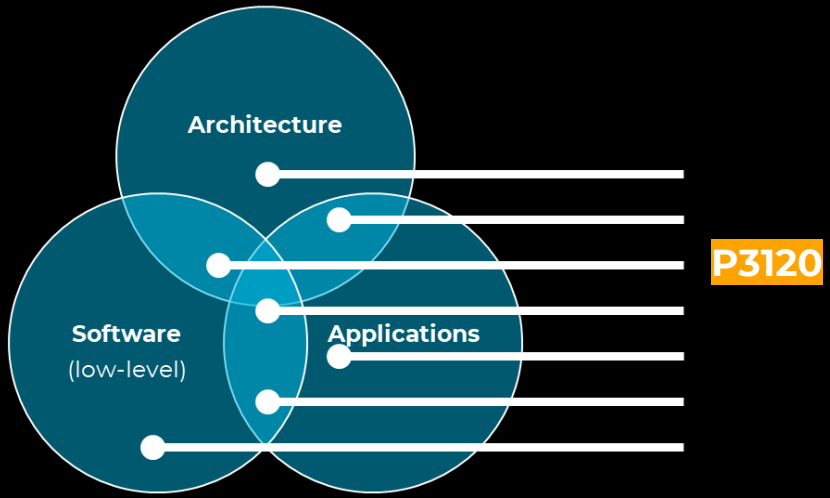
Quantum Technologies

Layer\Tech	Quantum Computing	Quantum Simulation	Quantum Communication	Quantum Sensors	PQC
Architecture	P3120 P7130 P7131	P3155			
Software (low-level)	P3120 P7130 P7131 *in progress*	P3155	P1913		P1943
Application	P2995	*in progress*			P3172

IEEE STANDARDS

Quantum Technologies

Layer\Tech	Quantum Computing
Architecture	**P3120** P7130 P7131
Software (low-level)	**P3120** P7130 P7131 *in progress*
Application	P2995



IEEE P1913

SOFTWARE-DEFINED QUANTUM COMMUNICATION

Scope

Active PAR

Feedback

Home › Projects › P1913

SUBSCRIBE

This standard defines the Software-Defined Quantum Communication (SDQC) protocol that enables configuration of quantum endpoints in a communication network in order to dynamically create, modify, or remove quantum protocols or applications. This protocol resides at the application layer and communicates over Transmission Control Protocol/Internet Protocol. The protocol design facilitates future integration with Software-Defined Networking and Open Networking Foundation OpenFlow. The standard defines a set of quantum device configuration commands that control the transmission, reception, and operation of quantum states. These device commands contain parameters that describe quantum state preparation, measurement, and readout.

Sponsor Committee COM/NetSoft-SC - Virtualized and Software Defined Networks, and Services Standards Committee

IEEE P1943

STANDARD FOR POST-QUANTUM NETWORK SECURITY

Scope

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Feedback

SUBSCRIBE

This standard defines a method to implement optimized post-quantum version of existing network security protocols [1]. It is based on a multi-layer protocols approach and allows data packets and/or data encapsulated to be quantum resistant to future cryptographically relevant quantum computers (CRQCs). This standard includes hybrid modes for key exchange and authentication and specifies mechanisms for handling the larger public key sizes of post-quantum algorithms. This standard excludes any definition of a new post-quantum cryptography (PQC) algorithm.

Sponsor Committee COM/NetSoft-SC - Virtualized and Software Defined Networks, and Services Standards Committee

IEEE P2995

TRIAL-USE STANDARD FOR A QUANTUM ALGORITHM DESIGN AND DEVELOPMENT

Scope

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Feedback

Home › Projects › P2995

This trial-use standard defines a standardized method for the design of quantum algorithms. The defined methods apply to any type of algorithm that can be assimilated into quantum primitives and/or quantum applications. The design of the algorithms is done preceding quantum programming.

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Sponsor Committee C/S2ESC - Software & Systems Engineering Standards Committee

Learn More ›

IEEE P3120

STANDARD FOR QUANTUM COMPUTING ARCHITECTURE

Scope

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This standard defines technical architectures for a quantum computers based on the technological type (e.g., fault-tolerant universal quantum computing) and one or more qubit modalities (e.g., superconducting quantum processor). The defined architectures include the hardware (e.g., signal generator) and low-level software (e.g., quantum error correction) components of a quantum computer. The standard excludes any definition of a quantum circuit or algorithm.

Sponsor Committee C/MSC - Microprocessor Standards Committee

Learn More ›

IEEE P3155

STANDARD FOR PROGRAMMABLE QUANTUM SIMULATOR

Scope

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This standard defines programming methods of quantum simulators according to analog (i.e., target Hamiltonian), digital (i.e., non-native Hamiltonian evolution) and hybrid (i.e., quantum-quantum or quantum-classical architectures) devices for the simulation of quantum phenomena beyond classical computing applications. This standard includes algorithms to represent the nano-scale properties of quantum simulation devices, and excludes any proposal for the architecture of quantum simulators.

Sponsor Committee NTC/SC - Standards Committee

IEEE P3172

RECOMMENDED PRACTICE FOR POST-QUANTUM CRYPTOGRAPHY MIGRATION

Scope

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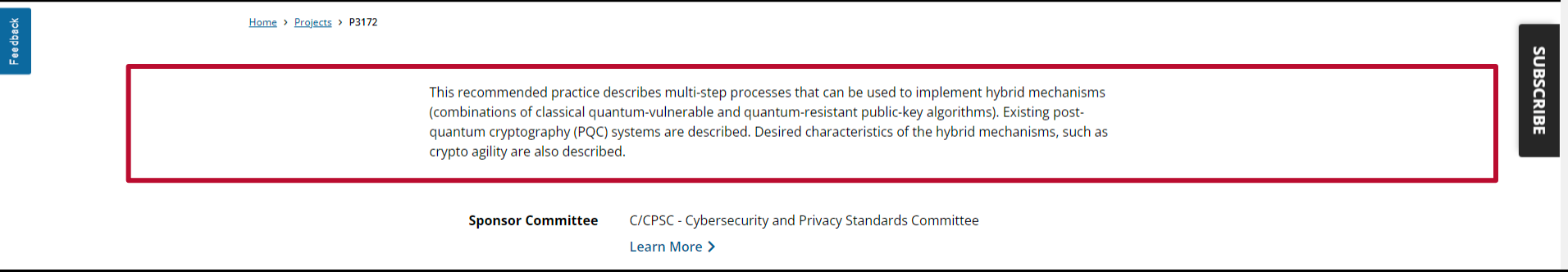
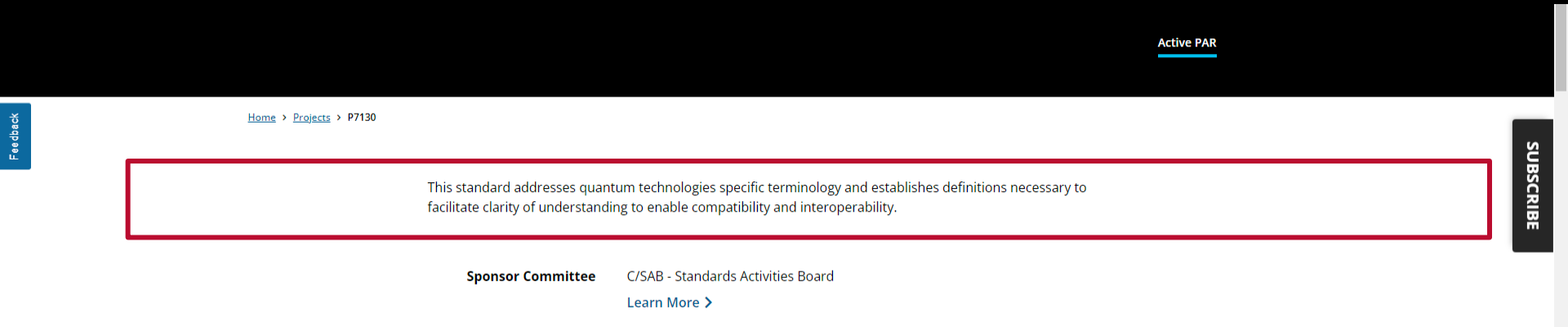


IEEE P7130

STANDARD FOR QUANTUM TECHNOLOGIES DEFINITIONS

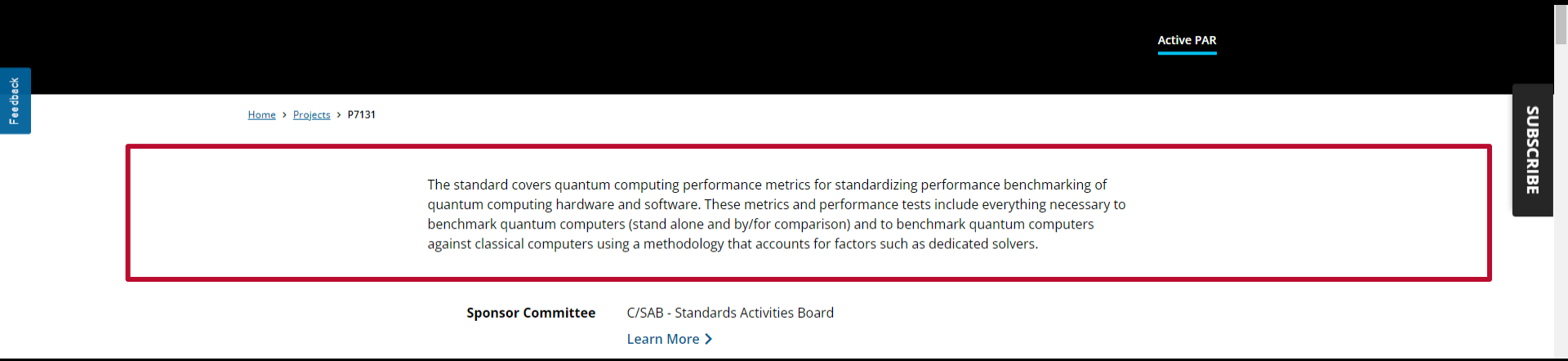
Scope



IEEE P7131

STANDARD FOR QUANTUM COMPUTING PERFORMANCE METRICS & PERFORMANCE BENCHMARKING

Scope



THANK YOU!

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TO CONCLUDE

- IEEE SA has eight active standards projects on quantum technologies
- IEEE is in liaison with ISO WG 14 and soon with CEN/CENELEC
- It would be relevant to establish a liaison with WG Standards QuIC and IEEE SA

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To join IEEE WGs:

go[NNNN].ieee2.org

(e.g., go2995.ieee2.org)

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