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ASX Announcement (ASX: **AXE**) 19 November 2020

Progress towards qubit control

Highlights

- First stages of Archer's qubit control measurements are completed, advancing ^{12}CQ chip development towards a significant technology milestone.
- Archer is building qubit control devices and utilises over $150 million of world-class facilities and custom-built infrastructure to validate its technology.
- Archer is one of few key players† building hardware (e.g. qubit processors) in the emerging multibillion dollar global quantum computing economy‡.

Archer Materials Limited ("Archer", the "Company", "ASX: **AXE**") is pleased to update shareholders on the significant progress that the Company has made in advancing the current stage of development of its ^{12}CQ quantum computing chip ("chip"), which is focused on achieving the major technological milestone of *qubit control*.

Commenting on progress towards qubit control, Archer CEO Dr Mohammad Choucair said: "We are incredibly proud of these latest results which show that we are making significant progress toward our goal of qubit control. Achieving qubit control is required for operational devices and would be major validation of the commercial viability of the ^{12}CQ chip.

"Archer is well-funded and on-track to continue its ^{12}CQ chip technology development, with a key focus on demonstrating few and single-qubit control."

Progress towards qubit control in Archer's ^{12}CQ chip

Archer has now built a number of the qubit control devices ("QC Devices") required for ^{12}CQ chip development, optimising its first QC Devices (ASX ann. 10 Aug 2020). The Company has engineered and commenced operating the infrastructure and specialised equipment required to perform qubit control using various QC Device configurations (Image 1).

The Company has completed the preliminary stages of its quantum measurements towards qubit control by successfully characterising optimised and unoptimised QC Devices. The information obtained (*e.g.* device response to 'pulse sequences') will greatly expedite further progress in the ^{12}CQ qubit control measurements.

Archer is working with world-leading physicists in top-tier institutes in Australia and Switzerland to achieve qubit control in Archer's unique qubit material. The optimisation of QC

† https://www.nature.com/articles/s42254-020-00247-5; also https://www.ibm.com/quantum-computing/network/members/
‡ https://www.bcg.com/en-au/publications/2020/how-financial-institutions-can-utilize-quantum-computing

Devices' designs would allow for qubit control in a number of qubit components (i.e. a scalable array, which is required in an operational device).

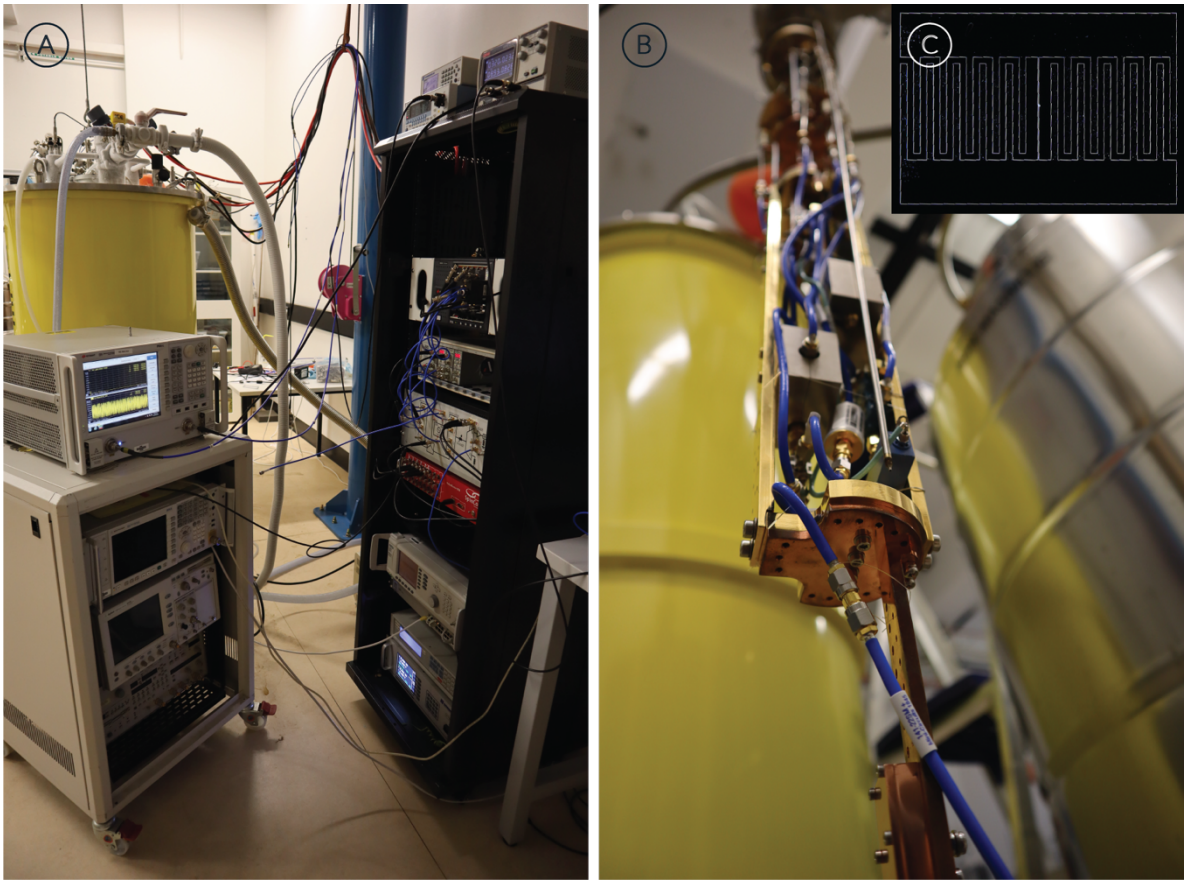

Image 1. Quantum measurement setup for qubit control. The state-of-the-art setup where the first quantum control measurements are being performed on Archer's ^{12}CQ qubit material. ***A*** The cryogenic chamber (yellow) together with quantum control instrumentation to perform the sophisticated quantum measurements. ***B*** The QC Devices (about half a millimetre in size, inset ***C***) are mounted at the bottom of the cryogenic insert which is cooled to very low temperatures during the preliminary measurements. The setup and infrastructure shown here is worth over $10 million.

Archer's qubit control tech development to date

The Company recently begun its technology development related to qubit control that is required for ^{12}CQ chip operation (ASX ann. 9 Jul 2020) and the first QC Devices were rapidly designed and built in-house (ASX ann. 10 Aug 2020).

Archer for the first time also computationally modelled the ^{12}CQ unique qubit material (ASX ann. 12 Oct 2020) as part of the Company's broader technology development involving the characterisation of the qubit and related materials (which also directly relates to qubit control).

It is important to note that the greatest amount of value creation in quantum computing is generated from technology development[§] and Archer is one of very few companies in the world that are successfully developing and building a quantum computing qubit processor[†].

[§] https://www.bcg.com/en-au/publications/2019/quantum-computers-create-value-when

Qubit control is an essential step towards ^{12}CQ chip operation

The Company's technology development is focused on achieving quantum control of a single qubit by building QC Devices that are essential to validate the operation of the ^{12}CQ chip. Archer designs and builds its QC Devices in a world-class $150 million semiconductor chip prototyping foundry.

The qubit control measurements are ongoing and are being performed in parallel to other technology development work packages and intellectual property (international patent) prosecution and commercialisation, and key progress will be released to ASX.

About ^{12}CQ

^{12}CQ is a world-first technology that Archer aims to build for quantum computing operation at room-temperature and integration onboard modern electronic devices. For more information about Archer's chip technology, please view Archer's most recent webinar held with IBM.

About Archer

A materials technology company developing innovative deep tech in quantum computing, biotechnology, and reliable energy. The Company has strong intellectual property, world-class in-house expertise, a unique materials inventory, and access to Tier 1 technology development infrastructure.

The Board of Archer authorised this announcement to be given to ASX.

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