

Community

News

<https://doi.org/10.1515/aot-2020-0057>

A 1000+ qubit computer by 2023

On September 15, Jay Gambetta published a blog post on “IBM’s Roadmap for scaling quantum technology” [1]. Gambetta is an IBM Fellow and Vice President, IBM Quantum. In contrast to roadmaps, example, for semiconductor development, this roadmap is limited to a perspective for the next four years. Nevertheless, the presented steps toward the commercialization of IBM’s quantum computers are ambitious.

Gambetta compares the development of quantum computers with the effort of the moon landing in 1969. Given the multibillion funding initiatives which are currently exercised in various countries he might be right. It took huge amounts of money to take a few men to the moon and to bring them back safely. Similarly, it may take large investments in research and development to get to, as Gambetta says, “the million-plus qubit devices of the future”. IBM is one of the few large non-governmental players (such as Google) who embark on such a development.

Doubling qubit numbers every year

IBM has a long record in developing quantum technologies and an even longer history in introducing such new technology into industrial technology. For example, the first transistor-based computers were brought to market by IBM in the late 1950s.

In more recent years, namely 2019, they presented the IBM Q System One as “the world’s first integrated universal approximate quantum computing system for commercial use.” In the same announcement [2], they also estimated that they need to at least double quantum volume every year to achieve the so-called Quantum-Advantage in the 2020s.

That estimation is turned into a plan in their roadmap blogpost. With the recent upgrade of one of their 27-qubit systems, they reached 64 qubits [3] this year. Their roadmap extends to 2023, when IBM plans to present their 1.121 qubits system named Condor. As a major challenge they see cooling. Thus, they started to build their own dilution refrigerator codenamed “Goldeneye”, which would be larger than any other commercially available system. That is, as they say, planned for a million qubits.

What for?

While the moonshot was created in a cold war race mainly for publicity, quantum computing claims to solve real world problems. One could be in material science. IBM scientists want to use quantum computers and artificial intelligence to reduce the development times and costs for new materials by 90% [4]. It remains to be seen whether IBM remains on track, and more importantly, whether quantum computers will make an impact to everyday life. Or whether it will land in a museum like the moon rockets.

References

- [1] <https://www.ibm.com/blogs/research/2020/09/ibm-quantum-roadmap/>.
- [2] <https://www.ibm.com/blogs/research/2019/03/power-quantum-device/>.
- [3] <https://newsroom.ibm.com/2020-08-20-IBM-Delivers-Its-Highest-Quantum-Volume-to-Date-Expanding-the-Computational-Power-of-its-IBM-Cloud-Accessible-Quantum-Computers>.
- [4] <https://www.ibm.com/blogs/research/2020/09/ibm-5-in-5-accelerating-process-of-discovery/>.

Community

EOS News

EOSAM 2020 held an online conference for the first time ever!

Initially, the European Optical Society (EOS) planned to celebrate its Annual international conference and industrial exhibition, EOSAM, under the warm sun of Porto, Portugal. The meeting was organized together with the Portuguese Society for Optics and photonics, SPOF, to take place from 7 to 11 September 2020. However, due to the circumstances with the Covid pandemic, we wanted to ensure the safety of our attendees and their families, and made the difficult decision to move the onsite event into the online form, for the first time ever in the history of EOSAM.

During the conference week, 7–11 September, EOS offered live and on-demand presentations free of charge for attendees, with a chance to register and view the presentations also after the conference week until 25 September.

120 presentations and more...

The conference week included the School of Physics on Optical Metrology, four live plenary talks and over 120 invited and contributed presentations on all the topical meetings.

On Monday, the Physics School on Optical Metrology was held with three intriguing talks on the topic. The general assembly was held as an online meeting to all EOS members, where EOS goals and activities were presented to the members.

At the opening ceremony on Tuesday, we had the privilege to hear the plenary talk from Yuri Kivshar from

the Nonlinear Physics Center at the Australian National University, Canberra, Australia, on *Metaphotonics and metasurfaces*.

On Tuesday, Hatice Altug from the Institute of Bioengineering, Ecole Polytechnique Federale de Lausanne, Switzerland, held her plenary talk on *New Frontiers in Nanophotonics: Next-Generation BioSensors*. This was a special session as Hatice also received the esteemed Emmy Noether distinction from the European Physical Society (EPS) after her talk.

Later in the week, we heard the plenary talks from Luis Plaja, University of Salamanca, Spain on *Boost in translation: Structuring high-frequency light using high-harmonic sources*, and the plenary talk from José Luís Santos, Physics and Astronomy Department of Faculty of Sciences of University of Porto, Portugal on *New Paths in Optical Sensing*.

See you in Paris!

This year has certainly been challenging for all, but it was nice to see the community coming together online to present and view the latest research in the field. It was a great pleasure to provide a platform for the researchers to present their research, in times when conferences in person cannot be held.

We wish to warmly thank all our attendees, speakers, chairs, program committee members, sponsors, the EOS Partner societies, the Portuguese Society for Optics and Photonics, and the local support in Porto for creating the event.

We hope to see you all in person in Paris, at the EOSAM in 6–11 September 2021!

<https://www.europtics.org/events/eos/eosam2021.html>

Community

Conference Calendar

The Calendar has been reviewed on 1st October. Due to further regulations in response to the worldwide pandemic, dates or locations may vary from this list.

Nevertheless, the pandemic may offer new opportunities as well. Please visit the website of a conference you missed. Some offer on-demand viewing of the meeting. And most often, it is for free!

October

OSA Laser Congress/ASSL

Virtual web conference

12–16. October 2020

www.osa.org/Meetings/OSA_Meetings/Laser_Congress

FOC 2020

Frontiers of Optical Coatings

Beijing, China

17–22. October 2020

<http://foc.tongji.edu.cn/index.php?>

November

VISION: canceled

Stuttgart, Germany

Moved to October 2021

www.messe-stuttgart.de/vision/

SPIE Future Sensing Technologies

Digital Forum

9–13. November 2020

<https://spie.org/x132696.xml>

December

SPIE Astronomical Telescopes + Instrumentation

Digital Forum

14–18. December 2020

<https://spie.org/x127041.xml>

2021

February

SPIE Medical Imaging

San Diego, CA, USA

14–18. February 2021

www.spie.org/mi

SPIE Advanced Lithography

San Jose, CA, USA

21–25. February 2021

www.spie.org/al

March

SPIE Photonics West

San Francisco, CA, USA

6–11. March 2021

www.spie.org/pw

SPIE AR | VR | MR

San Francisco, CA, USA

7–9. March 2021

<https://spie.org/x124250.xml>

Optical Fiber Communication

San Francisco, CA, USA

28 March–1 April 2021

www.ofconference.org

April

OSA Biophotonics Congress

Vancouver, BC, Canada

12–15. April 2021

www.osa.org/en-us/meetings/osa_meetings/osa_biophotonics_congress/

SPIE Defense + Commercial Sensing

Orlando, FL, USA

11–15. April 2021

www.spie.org/dcs

SPIE Optics + Optoelectronics

Prague, Czech Republic

19–22 April 2021

www.spie.org/oo

May

CLEO 2021

San Jose, CA, USA

9–14. May 2021

www.cleoconference.org

DGaO Tagung

Bremen, Germany

25–29. May 2021

www.dgao.de

June

LASER World of Photonics

Munich, Germany

21–24. June 2021

www.laser.de

World of Photonics Congress

Munich, Germany

20–24. June 2021

www.photonics-congress.com/en/**SPIE Conferences @WoP Congress****Biomedical Optics****Digital Optical Technologies****Optical Metrology**

Munich, Germany

20–24. June 2021

<https://spie.org/conferences-and-exhibitions>**OSA Optical Design and Fabrication Congress**

Providence, Rhode Island, USA

27 June–1 July 2021

www.osa.org/en-us/meetings/osa_meetings/optical_design_and_fabrication/**September****EOS Annual Meeting**

Paris, France

6–10. September 2021

www.europeanoptics.org/events/eos/eosam2021.html**October****VISION**

Stuttgart, Germany

5–7.10.2021

www.messe-stuttgart.de/vision/**Frontiers in Optics: the 105th OSA Annual Laser Science Conference**

Washington, DC, USA

10–14. October 2021

www.osa.org/en-us/meetings/global_calendar/events/frontiers_in_optics_the_105th_osa_annual_meeting_a/**SPIE Optifab**

Rochester, NY, USA

18–21. October 2021

<https://spie.org/x125984.xml>**2022****Optical Fiber Communication**

San Diego, CA, USA

6–10. March 2022

www.ofcconference.org**AKL'22**

Aachen, Germany

4–6. May 2022

www.lasercongress.org**CLEO**

San Jose, CA, USA

15–20. May 2022

www.cleoconference.org**DGaO Tagung**

Gent, Belgium

7–10. June 2022

www.dgao.de**LASYS**

Stuttgart, Germany

21–23 June 2022

www.messe-stuttgart.de/lasys/