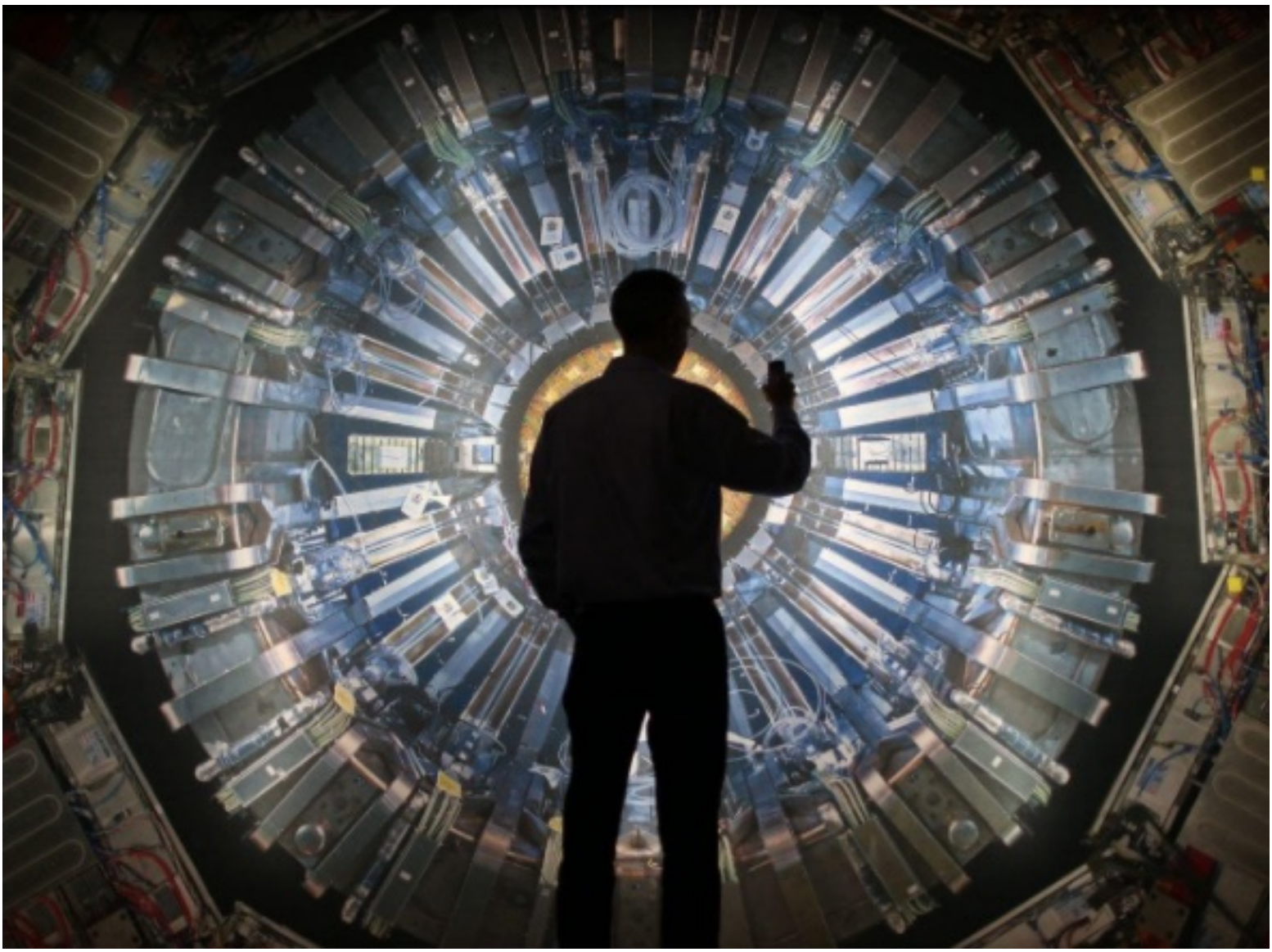
OPINIONS (HTTPS://ANALYTICSINDIAMAG.COM/CATEGORY/ARTICLES/)

Role Of Quantum Computers In Particle & Astroparticle Physics

BY KRISHNKUMAR GUPTA (HTTPS://ANALYTICSINDIAMAG.COM/AUTHOR/KRGUPTA1995GMAIL-COM/)
19/10/2020



Scroll To Top

Recent advancement in quantum computers (https://analyticsindiamag.com/google-news-dwave-quantum-computer-nvidia-vmware/) completely has changed the persona of the 21st century, it provides more secure communication. In comparison to conventional computers, quantum computers are more advance and faster in performing the various complicated operations. At present, the physicist and engineers are imposing their lot of efforts in improving quantum computers.

This computer extensively works on the realms of Quantum Mechanics. In brief, it accomplishes the computational task (https://analyticsindiamag.com/top-ai-news-of-the-week/) by manipulating the quantum phenomena such as the superposition and entanglement. To perform complicated particle and astroparticle physics experiments with clear understanding, it necessarily requires the more reliable source of technology to analyze almost hundred petabytes of data produced during the experiments.

This becomes impossible for conventional computers to handle such a huge amount of data. This is the reason why a large number of research institute investing lots of time and efforts towards the improvement of quantum computers.

WHY PHYSICIST ARE BECOMING MORE RELIABLE ON MODERN QUANTUM COMPUTERS?

In the present time, an international collaboration of CERN in Geneva is exploring how quantum computers could be used to analyze the enormous amount of data which produce by the detectors of Large Hadron Collider (LHC) during the particle collision process. Presently, LHC is undergoing into up-gradation which effectively enhance the particle collision rate and expected it will increase the computing efficiency by the factor of 50 to 100 times.

The scientists at CERN are anticipating it will entirely accessible in operation again by 2027. In this duration for the future reference, a quantum computer could be introduced into the operation of CERN's experiments. Besides this operations, the important role of LHC experiments is to test the Standard Model of particle physics up to its extreme limits in the search for new physics – and quantum computing could be the game-changer in this process.

Since 2018, the CERN openlab, Fermilab, and IBM already have initiated working on quantum computers. Also, they are looking at the modern approach to understand the quantum machine learning process that could identify the presence of low energy Higgs Boson particles in collision experiments. Meanwhile, the scientists at Fermilab are trying to develop an algorithm to use quantum computers to simulate the basic interactions of fermionic and Bosonic particles that hold our universe together.

SEE ALSO

(https://analyticsindiamag.com/machine-learning-anomaly-siddharth-bhatia-nus/)

DEVELOPERS CORNER (HTTPS://ANALYTICSINDIAMAG.COM/CATEGORY/DEVELOPERS_CORNER/)

Why Machine Learning Is The Right Fit For Anomaly Detection: Interview With Siddharth Bhatia (https://analyticsindiamag.com/machine-learning-anomaly-siddharth-bhatia-nus/)

In future, it will possibly give us a brief idea about what is dark matter made of and answers to the existence of our universe. In March 2020, the Cambridge Quantum Computing (CQC) has joined CERN openlab in collaboration to the QUATERNION project – to explore the application of quantum technologies to particle physics. I guess, in a few years we will know the answers to the well-known questions like why we exist? What dark matter contains? Why the universe is expanding? Is any habitable planet exist?

CONCLUDING NOTE

The way Spiderman says in the movie "with great power, comes great responsibility", I guess the similar way in the future quantum computing and machine learning might play the big responsible role to show us what is beyond the Standard Model physics, will give us the concrete existence of God particle, clearly show us the picture of black holes, reveal the unanswered dark matter mysteries and shows the way to the Mars.

Presently, we are just a decade away from the future of quantum technology and machine learning process. It will not only solely dominate the research fields but also leave the impact in the private sectors. I think the theory scientist has proclaimed 50 years ago – "The future is quantum technology", it getting to be true. But the future is always unpredictable, sometimes it requires more time and right tracks to achieve goals. Let's hope we will witness the world thriving with quantum technology.

What Do You Think?