

# Alice & Bob Secures \$3.9M ARPA-E Award to Use Quantum Computing to Design Rare-Earth-Free Magnets

BOSTON, MA, UNITED STATES, March 31, 2026 /EINPresswire.com/ -- Alice & Bob, a leader in fault-tolerant quantum computing, has been awarded \$3.9 million from the U.S. Department of Energy's [Advanced Research Projects Agency-Energy \(ARPA-E\)](#) Quantum Computing for Computational Chemistry (QC3) program to develop fault-tolerant quantum algorithms aimed at discovering rare-earth-free permanent magnets - a critical component in electric motors and turbines.

To meet their goal, Alice & Bob will strive to achieve a 10,000-fold speed-up in computing time compared to state-of-the-art classical simulations, enabling realistic material calculations within approximately one day. They will show this speed-up experimentally on Alice & Bob's fault-tolerant quantum computers, and theoretically with resource estimates.

"Designing high-performance magnets without rare earth elements is one of the hardest problems in material science, as these materials are extremely difficult to simulate with classical computers. A hybrid approach - where classical methods compute environmental parameters and quantum computers simulate highly correlated electronic systems more accurately - could significantly accelerate the discovery of new magnetic materials." said Juliette Peyronnet, U.S. General Manager at Alice & Bob.

Alice & Bob will lead the three-year project in collaboration with [Los Alamos National Laboratory](#), [GE Vernova's](#) Advanced Research accelerator, and Professor Emanuel Gull (a visiting Professor at Warsaw University and a Professor at University of Michigan), leading a group that will create classical algorithms that will work in conjunction with Alice & Bob's quantum algorithms. Los Alamos will develop tensor network tools to optimize quantum circuits, and GE Vernova's





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*Marco Cerezo, Los Alamos scientist & Laboratory lead*

Advanced Research accelerator will perform a technoeconomic analysis of material discovery opportunities enabled by the hybrid algorithm.

“Finding ways to prepare high quality states via tensor network optimization is a critical tool that will help develop fault-tolerant quantum algorithms applied to challenges like rare-earth-free minerals permanent magnets,” said Marco Cerezo, Los Alamos scientist and Laboratory lead on the project. “This team effort converges expertise to

leverage quantum computing for an important, practical outcome.”

“Our team is excited to collaborate with this outstanding technical team and ARPA-E to evaluate how quantum computing could drive forward industrial materials design and discovery,” said Jonathan Owens, Senior Scientist - Computational Materials Physics at GE Vernova’s Advanced Research Center in Niskayuna, NY, U.S.A.

High-performance magnets underpin many technologies central to the global energy transition. Today’s dominant magnet, neodymium-iron-boron (NdFeB), was discovered in the 1980s and relies on rare-earth elements and related processes whose supply chains are geographically concentrated and politically constrained.

Finding alternatives has proven difficult. The magnetic behavior of candidate materials emerges from complex quantum interactions between electrons, making accurate simulation extremely challenging for classical computers. Quantum computers, which directly model quantum systems, could allow researchers to simulate these materials far more efficiently.

If successful, the approach could accelerate the development of cheaper, more sustainable magnets for future energy and industrial technologies. The algorithm developed could also be easily adapted to solve other challenging problems in chemistry and materials science.

#### About Alice & Bob

Alice & Bob is a quantum computing company based in Paris and Boston whose goal is to create the first universal, fault-tolerant quantum computer. Founded in 2020, Alice & Bob has raised €130 million in funding and employs more than 200 people.

Advised by Nobel Prize winning researchers, Alice & Bob specializes in cat qubits, a technology developed by the company’s founders. Demonstrating the power of its cat architecture, Alice & Bob recently showed that it could reduce the hardware requirements for building a useful large-scale quantum computer up to 200 times compared with competing approaches. For more information, visit [www.alice-bob.com](http://www.alice-bob.com).

## About GE Vernova

GE Vernova Inc. (NYSE: GEV) is a purpose-built global energy company that includes Power, Wind, and Electrification segments and is supported by its accelerator businesses. Building on over 130 years of experience tackling the world's challenges, GE Vernova is uniquely positioned to help lead the energy transition by continuing to electrify the world while simultaneously working to decarbonize it. GE Vernova helps customers power economies and deliver electricity that is vital to health, safety, security, and improved quality of life. GE Vernova is headquartered in Cambridge, Massachusetts, U.S., with approximately 85,000 employees across approximately 100 countries around the world.

GE Vernova's Advanced Research accelerator is an innovation powerhouse, operating at the intersection of science and creativity to turn cutting edge research into impactful realities. Advanced Research collaborates with GE Vernova's businesses across a broad range of technical disciplines to accelerate the energy transition.

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