

Tri Alpha Energy and Google Combine Human and Machine Interaction to Further Plasma Science

“Optometrist Algorithm,” First Described Today in the Journal Scientific Reports, Identified Optimal Fusion Conditions

FOOTHILL RANCH, CA – July 25, 2017 – In a paper published today in the journal *Scientific Reports*, researchers from [Tri Alpha Energy \(TAE\)](#), the world’s largest private fusion company, and Google have jointly furthered the understanding of physics and computational design, applying a new approach to solving highly complex problems regarding plasma behavior. The findings will help TAE achieve optimal conditions for fusion energy, and may offer future benefits to other complex, variable areas of research.

The achievement is the first publicly-announced result of a multi-year relationship between TAE and Google, which began in 2014 to apply machine learning to advance plasma research.

Plasma science is a challenging field of study as its subject exhibits complicated behaviors and relies on engineering mechanisms that themselves pose variable conditions and input parameters. Experimental by nature, plasma fusion devices require human judgement to assess results and ensure the operations of one-of-a-kind machinery, further limiting traditional test capabilities.

To increase the speed of learning within these boundaries, researchers from the two companies innovated upon a stochastic perturbation method, one similar to those used in large-scale population and atmospheric models, by incorporating an element of human choice. The team’s “Optometrist Algorithm,” like an eye exam, requires researchers to choose between successive pairs of possible outcomes identified within the experiment to focus on those producing subjectively better results for fusion experiments.

This groundbreaking technique led to the discovery of unexpected plasma confinement results increasing net heating power within TAE’s proprietary field-reversed configuration plasma generator, a more than 50% reduction in energy loss rate and concomitant increase in ion temperature and total plasma energy. Experimental settings specifically revealed particle beam heating led to sustained ion temperature increases, marking significant improvements in plasma containment and stability.

“Results like this might take years to solve without the power of advanced computation to rapidly scale our understanding of the complex properties of plasma. This research, years in the making, has already allowed us to advance our science, and I am grateful for the longstanding collaboration with Google as it illustrates how, with a lean start-up design, TAE can direct research to outcomes that specifically advance and accelerate our mission to generate clean, safe and abundant energy through fusion technology,” said Michl Binderbauer, TAE’s President and Chief Technology Officer.

The full paper can be read here: <https://www.nature.com/articles/s41598-017-06645-7>.

Building on the success of the Optometrist Algorithm, Google and TAE will continue to collaborate on Norman, the company's new plasma generator, which initiated operations last month.

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About Tri Alpha Energy

With nearly 20 years of focused research, TAE is leveraging proprietary science and engineering to solve the quintessential problem of our time: how to harness an unlimited and powerful source of clean, renewable energy. Using a unique pathway to fusion energy powered by nature's own processes that we call Friendly Fusion, the company's approach combines advanced accelerator and plasma physics to create a commercially viable fusion power plant that is compact, safe, carbon-free and sustainable. For more information, please visit www.tae.com.