



Proxima Fusion and partners publish fusion power plant concept to bring limitless, safe, clean energy to the grid

- New [peer-reviewed paper](#) published in *Fusion Engineering and Design* presents [Stellaris](#), the world's first integrated concept for a commercial fusion power plant designed to operate reliably and continuously.
- Stellaris leverages advances in high-temperature superconducting magnets and computational optimization to present a high-field stellarator design that balances physics performance and engineering constraints for power production for the first time.
- Proxima Fusion is on track to build its demonstration stellarator, Alpha—which will show net fusion energy in a concept capable of continuous operation for the first time in 2031, opening the door to the commercial application of fusion energy.

Munich, February 26, 2025 — [Proxima Fusion](#), Europe's fastest-growing fusion energy startup, and its partners today published a new peer-reviewed paper announcing the world's first integrated concept for a commercial fusion power plant designed to operate reliably and continuously. Published in *Fusion Engineering and Design*, the Stellaris concept is a major milestone for the fusion industry—advancing the case for quasi-isodynamic (QI) stellarators as the most promising pathway to a commercial fusion power plant.

Stellaris builds on the record-breaking results of the [Wendelstein 7-X \(W7-X\)](#) research experiment in Germany, the most advanced QI stellarator prototype in the world, directed by the [Max Planck Institute for Plasma Physics](#) (IPP) and the product of over €1.3B in funding from the German Federal Government and the European Union.

From W7-X to the future: the path to commercial fusion energy

The Stellaris work is the result of a public-private partnership between Proxima Fusion engineers and IPP scientists. As the IPP's first spin-out company, Proxima Fusion has been building on the institute's cutting-edge experimental and theoretical work, with a strong engineering workforce from the likes of Google, Tesla, McLaren Formula-1, and SpaceX.

Dr. Francesco Sciortino, Co-Founder and CEO of Proxima Fusion, said: “The path to commercial fusion power plants is now open. Stellaris is the first peer-reviewed concept for a fusion power plant that is designed to operate reliably and continuously, without the instabilities and disruptions seen in tokamaks and other approaches. Given increasing global energy demands and the escalating need for European energy security, unlocking limitless, clean energy through fusion has never been more urgent, and Proxima is committed to leading Europe into a fusion-powered future.”

Fusion power in the next decade

Stellaris is designed to produce much more power per unit volume than any stellarator power plant ever designed before.

The much stronger magnetic fields that are enabled by high-temperature superconducting (HTS) magnet technology allow for a significant reduction in size compared to previous stellarator concepts. Smaller reactors can be built more quickly, provide more efficient energy generation, and promise to be more cost-effective in both construction and operation. The Stellaris concept also makes use of only currently available materials, meaning it will be buildable by expanding on today's supply chains.

Proxima's simulation-driven engineering approach has enabled rapid design iterations, leveraging advanced computing. Stellaris is the first Q1 stellarator-based power plant design that simultaneously meets all major physics and engineering constraints, as demonstrated through electromagnetic, structural, thermal, and neutronics simulations. With the marriage of physics and engineering, enabled by the partnership with the IPP, Proxima is now poised to take a bold leap with its demonstration stellarator, Alpha, as opposed to building several devices with incremental improvements over a period of decades.

The groundbreaking technical features of the Stellaris design include:

- a magnetic field design that obeys all key physics optimization goals for energy production;
- support structures that can bear the forces present when operating at full power;
- a showcase that HTS technology can be effectively integrated in high field stellarators, while ensuring effective heat management on internal surfaces;
- a neutron blanket concept that is adapted to the complex geometry of stellarators

From vision to reality: bringing the power plant to life

Through its Stellarator Model Coil (SMC) demo magnet in 2027, Proxima Fusion will fully de-risk HTS technology for stellarators. The company will demonstrate that stellarators are capable of net energy production with its demo stellarator Alpha in 2031, and aims to deliver limitless, safe, clean fusion energy to the grid in the 2030s.

Prof. Dr. Per Helander, Head of the Stellarator Theory Division at the Max Planck IPP, said: “IPP is a pioneer of stellarator optimization. In recent years we have been able to design stellarators whose physics properties are predicted to grant unprecedented performance. This still leaves many technological and engineering challenges, problems that have been courageously addressed by Proxima Fusion in collaboration with IPP in this first of its kind study. This is important and necessary work on the path toward a fusion power plant, which we hope to accelerate through this collaboration.”

Dr. Jorrit Lion, Co-Founder and Chief Scientist of Proxima Fusion, said: “For the first time, we are showing that fusion power plants based on QI-HTS stellarators are possible. The Stellaris design covers an unparalleled breadth of physics and engineering analyses in one coherent design. To make fusion energy a reality, we now need to proceed to a full engineering design and continue developing enabling technologies.”

Ian Hogarth, a Partner at Plural, one of Proxima Fusion’s earliest investors, added: “When Proxima started its journey, the founders said, ‘This is possible, we’ll prove it to you.’ And they did. Stellaris positions QI-HTS stellarators as the leading technology in the global race to commercial fusion.”

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For press inquiries, please contact press@proximafusion.com

About Proxima Fusion

[Proxima Fusion](#) spun out of the Max Planck Institute for Plasma Physics (IPP) in 2023 to build the first generation of fusion power plants using QI-HTS stellarators. Proxima has since assembled a world-class team of scientists and engineers from leading companies and institutions including the IPP, MIT, Harvard, SpaceX, Tesla, and McLaren. By taking a simulation-driven approach to engineering that leverages advanced computing and high-temperature superconductors to build on the groundbreaking results of the IPP’s W7-X experiment, Proxima is leading Europe into a new era of clean energy, for good.