



## **Proxima Fusion Awarded €6.5M from BMBF to Partner with the University of Bonn, Forschungszentrum Jülich, and the Technical University of Munich on AI for Fusion Engineering**

Munich, Germany, December 9, 2024 — Proxima Fusion announced today that it has been awarded a grant of €6.5M from the German Federal Ministry of Education and Research (BMBF) to advance the design and optimization of stellarator fusion power plants using artificial intelligence (AI) in partnership with the University of Bonn, Forschungszentrum Jülich, and the Technical University of Munich (TUM).

The “AI for Fusion Engineering” project partners combine interdisciplinary expertise in plasma physics, machine learning (ML), optimization, and computer science. Together, they aim to create AI-powered simulation tools capable of integrating physics and engineering simulations to optimize critical components of stellarators, including high-temperature superconducting (HTS) magnets, plasma-facing materials, and cooling systems.

“Stellarators can provide stable and continuous energy production, but are complex to design due to their 3D geometries,” said Proxima Co-Founder and CEO Dr. Francesco Sciortino. “This project will accelerate the stellarator design process, reduce costs, and improve the reliability and performance of these devices—which offer the clearest, most robust path to commercial fusion energy.” Proxima AI Lead Dr. Markus Kaiser added, “Proxima’s unique simulation-driven approach to fusion is an ideal driver for AI to have meaningful impact, collaborating with our in-house experts in fusion science and engineering.”

“By leveraging data-driven optimization techniques, geometric machine learning, and uncertainty-aware surrogate modeling, we can bring recent technological advances in scalable computation to stellarator design,” said Prof. Dr. Daniel Cremers, Chair of Computer Vision and Artificial Intelligence at the TUM School of Computation, Information and Technology.

“Our project will integrate AI with traditional engineering techniques, to overcome the limitations of current design methodologies and achieve computational feasibility,” said Dr. Dirk Reiser, team lead for theory and numerical simulations at Forschungszentrum Jülich. “We are

developing cheaper, cutting-edge AI modeling tools for plasma-surface interactions, working to solve one of the most difficult challenges in fusion.”

“The tools and technologies developed by this project also have broader implications beyond enabling more innovative and practical solutions for fusion energy, particularly for industries requiring complex engineering solutions such as aerospace and automotive manufacturing,” said Prof. Dr. Zorah Lähner, a leading geometric deep learning researcher at the University of Bonn and the Lamarr Institute.

As the lead partner, Proxima is responsible for the overall coordination of the project. The Munich-based startup is focused on designing and building commercially-viable stellarator fusion power plants, with the goal of putting fusion on the grid by the mid-2030s.

### **About Proxima Fusion**

Proxima Fusion spun out of the Max Planck Institute for Plasma Physics (IPP) in 2023 and has since worked in public-private partnership with IPP to further expand the physics and engineering basis to build the first generation of fusion power plants using quasi-isodynamic (QI) stellarators. Proxima’s simulation-driven engineering approach leverages advanced computing and high-temperature superconductors to build on the ground-breaking results of the Wendelstein 7-X (W7-X) experiment, the world’s most advanced stellarator at IPP.

### **About University of Bonn**

The University of Bonn and associated Lamarr Institute for Machine Learning and Artificial Intelligence, one of the five AI competence centers in Germany, contributes expertise in geometry optimization and machine learning. Researchers from the Geometry in Machine Learning group and the Learning and Optimization in Visual Computing group are involved in developing new geometric representations for optimizing stellarator designs. Their work focuses on creating AI-driven tools that can efficiently explore and manipulate the complex geometries required for stellarator components, particularly in terms of plasma shapes and magnetic coil configurations.

### **About Forschungszentrum Jülich**

Forschungszentrum Jülich brings extensive knowledge in materials science and plasma physics, with a focus on plasma-wall interactions and the behavior of materials exposed to high-energy particles in fusion reactors. Researchers are developing AI-based models to simulate material erosion and heat flux, helping to optimize the performance and durability of the stellarator’s components. Additionally, Forschungszentrum Jülich is working on AI-supported 3D plasma boundary simulations to improve predictions of plasma behavior in stellarators.

### **About Technical University of Munich (TUM)**

TUM’s Computer Vision group, known for its world-class research in optimization and machine learning, contributes to optimizing the performance and robustness of stellarator components. Their work focuses on using AI to make the components, especially HTS magnets, more resilient to manufacturing errors and performance degradation over time. TUM is also exploring

advanced AI techniques, such as geometric deep learning, to improve the efficiency and cost-effectiveness of stellarator design.