ΓΠΓ Energy

Executive Summary

Our technology enables drastic simplification of the inertial nuclear fusion powerplant, brings nuclear fusion – the source of limitless clean energy – closer to fruition and commercialization

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Co-investment Opportunity
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Development stage
Pre-revenue startup
Provisional patent filed

Year founded
2023

Funding Opportunity
$2M/year for 2 years

Use of Funds
50% Personnel
20% Prototype manufacturing
20% Prototype testing
10% IP protection

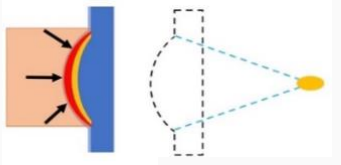
Goal of Funds
- Manufacture the first FIG prototypes
- Test them at user facilities (France, Czechia, Romania)
- Benchmark our proprietary simulation model against data
- Generate early FIGs sales to customers & potential partners

PROBLEM/OPPORTUNITY

Inertial fusion is the ultimate source of clean energy that produces neither nuclear waste nor greenhouse gases. Its huge attraction lies in its simplicity: the same process of generating fusion reactions inside tiny pellets of nuclear fuel is repeated over and over again, each time producing more energy than expended on compressing and igniting the pellets. The scientific demonstration of inertial fusion energy (IFE) production has occurred last year, clearing the conceptual path to energy-generating power plants. Unfortunately, there are at least two stumbling blocks on the path to commercially competitive fusion powerplants. First, the cost of electricity generation is set by the cost of the fusion target, which is prohibitively complex and expensive if the current approach to ignition is used. Second, the fixed cost of the ignition equipment is very high because of the required number of high-power lasers. Our products, Fast Ignition Generators (FIGs), resolve both issues by lowering the costs of the fusion targets and the complexity of the ignition lasers.

SOLUTION/PRODUCT

By using FIGs – patented micro-structures with designer shapes and material composition – we will provide an inexpensive and scalable platform for igniting fusion targets. The ignition process relies on illuminating FIGs with intense laser pulses and simultaneous acceleration and focusing of plasma ions onto a small spot on the fusion target at a well-defined time. Ion energy flux is drastically enhanced in comparison with all commercially available ion acceleration methods, resulting in ultrahigh energy-flux beams delivered to the target. This approach enables modestly-sized fusion power plants, and allows fusion energy production using existing laser technologies. The proposed technology can be also employed in two other market applications: ion beam cancer therapy and proton radiography.



BUSINESS MODEL

Unlike most inertial-fusion startups that are pursuing specific approaches to inertial fusion power plants, our products are totally agnostic to specific laser technologies and fusion target compositions that will be used at any given power plant. Our FIG microstructures can be integrated with any IFE approach, and will lower the costs of the target and the complexity of the laser system for any inertial fusion architecture. By supplying custom-designed at-scale manufactured FIGs to all future IFE power plants, we will generate a steady revenue stream that is independent of the prevailing IFE approach. Because our patented technology lowers the costs of both the lasers and the targets, our startup will become a highly valuable acquisition target for three types of commercial entities: target suppliers, laser manufacturers, and the ultimate power plant operators.

Potential partners. There are several well-capitalized IFE startups operating in this market, including: Focused Energy, LaserFusionX, Marvel Fusion, Longview Fusion Energy Systems, Xcimer Energy. Unlike our technology that relies on commercially available lasers, many of these startups rely on unproven laser technology. FIG microstructures will shorten their development timeline, reduce operating costs, and reduce the upfront costs.

TEAM

Dr. Gennady Shvets (PhD'95, MIT), founder and technical lead, is a Director of the Cornell Laboratory for Plasma Studies and a Professor of Applied and Engineering Physics. He has made seminal contributions to plasma physics and accelerator science, as well as nanophotonics. He has published >200 refereed papers and been named a Highly Cited Researcher in Physics in 2019-22: one of just four researchers at Cornell University. His combined backgrounds in plasma physics and nano-fabrication uniquely position him for this venture. **Business lead** - TBA