Richard P. Feynman Center for Innovation

Capability Snapshot

Technology Licensing Opportunity

Los Alamos NATIONAL LABORATORY

Accelerator-Driven Sub-Critical Molten-Salt Assembly (ADS+MSA Facility)

Unlocking commercial fusion energy through reliable, centralized tritium supply

Value Proposition

An accelerator-driven, sub-critical molten-salt nuclear system that centrally produces large quantities of tritium for fusion energy. By pairing accelerator-driven subcritical operation with molten-salt chemistry, the system offers a controllable, safety-forward pathway to produce fusion fuel, recover useful energy and convert legacy nuclear liabilities into strategic energy assets.

Technology Readiness Level 3-4

IP Information for S-195186

U.S. Patent pending

Contact Information

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Overview

The Accelerator-Driven Sub-Critical Molten-Salt Assembly (ADS+MSA) is a centralized nuclear facility that uses a high-power particle accelerator coupled to a liquid molten-salt system to reliably produce kilogram-scale quantities of tritium. Because the system is sub-critical, nuclear reactions only occur when driven by the accelerator, providing inherent safety and operational control. By combining proven accelerator technology with modern molten-salt chemistry, the ADS+MSA removes a major bottleneck to commercial fusion energy, recovers useful energy and strengthens U.S. energy security and national security missions under existing Department of Energy safety frameworks rather than commercial reactor licensing.

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Advantages

- Enables large-scale commercial fusion energy by providing a reliable, centralized source of tritium, eliminating the need for fusion plants to breed their own fuel and significantly reducing cost, complexity, and deployment risk.
- Operates in an inherently safe, sub-critical configuration in which nuclear reactions stop when the accelerator is turned off, avoiding runaway scenarios and allowing operation under DOE accelerator safety orders rather than NRC power-reactor licensing.
- Achieves extremely high tritium production efficiency, with tritium breeding ratios far exceeding those achievable in fusion reactor blankets, enabling kilogram-scale production with substantially lower accelerator power than earlier accelerator-only concepts.
- Builds on decades of proven accelerator development and growing industrial experience with molten-salt systems, reducing technical risk and enabling modular, scalable deployment as demand increases.

Market Applications

- **Fusion Energy**
- **Nuclear Waste Management**
- **Advanced Nuclear Energy**
- **Government Nuclear Asset Management**
- **Industrial Energy and Infrastructure**
- **Clean Energy and Decarbonization**

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NNSA National Nuclear Security Administration