ADVANCED FUSION SYSTEMS

JOB DESCRIPTION

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TITLE: Principal Scientist – High Voltage Pulsed Power & Advanced Simulation

DEPARTMENT: Corporate Research / Engineering

REPORTS TO: Chief Executive Officer FLSA STATUS:

Exempt EMPLOYMENT STATUS: Full-time

Position Summary

Advanced Fusion Systems, a rapidly growing technology company located in Newtown, CT, is seeking a highly accomplished PhD-level scientist or engineer to lead our corporate research initiatives in high-voltage pulsed power, electromagnetic transient phenomena, cold-cathode vacuum tube technologies, and advanced Multiphysics simulation. This role is central to shaping the next generation of AFS technologies, including medium-voltage EMP/E3 protection systems, fast-rise pulsed-power architectures, and novel high-energy switching and insulation concepts.

The Principal Scientist will serve as the company's senior scientific authority, driving long-range research strategy, developing advanced simulation models, and guiding the scientific direction of future products. This individual will work in close collaboration with the Director of Engineering to ensure seamless transition of research concepts into manufacturable, scalable technologies.

This position is ideal for a senior researcher who thrives in a hands-on environment and is motivated by the opportunity to build a world-class research program within a fast-moving, innovation-driven company.

Core Responsibilities

- **Lead corporate research programs in high-voltage pulsed power, fast-transient phenomena, insulation systems, and advanced electromagnetic structures.**
- **Develop and validate high-fidelity models using CST Studio Suite, including transient EM simulations, Multiphysics coupling, high-voltage breakdown modeling, and system-level pulse propagation.**
- **Lead the modeling, design, and experimental validation of cold-cathode vacuum tube technologies for pulsed-power switching, high-voltage modulation, and emerging applications.**
- **Generate new concepts, architectures, and methods that advance AFS's proprietary technologies; contribute to patents, publications, and internal technical reports.**

- **Architect laboratory experiments, pulse-power test setups, and diagnostic methods to validate simulation results and characterize prototype performance.**

- **Provide scientific guidance to engineering teams working on product development, testing, reliability, and manufacturability.**

- **Mentor junior engineers and support the development of internal technical capabilities in pulsed power, EM modeling, and high-voltage design.**

- **Interface with universities, national labs, industry partners, and vendors to support collaborative research and technology maturation.**

- **Work with the CEO and Director of Engineering to define research priorities, evaluate emerging technologies, and guide long-term product evolution.**

- **Produce high-quality technical documentation, research summaries, and presentations for internal and external stakeholders.**

- **Perform other related responsibilities as assigned.**

Minimum Qualifications

Education

- **PhD in Electrical Engineering, Physics, Applied Physics, or a closely related field with specialization in high-voltage systems, pulsed power, electromagnetics, or plasma physics.**

Experience

- **Demonstrated research experience in high-voltage or pulsed-power systems, fast transients, Marx or Blumlein architectures, insulation coordination, or related fields.**

- **Strong record of publications, patents, or equivalent industry accomplishments.**

- **Experience leading research programs or major technical initiatives.**

Technical Skills

- **Expert-level proficiency with CST Studio Suite (Time Domain Solver, PIC, Multiphysics, EM Transient).**

- **Deep understanding of cold-cathode vacuum tube physics, including field emission, plasma formation, breakdown mechanisms, and high-current pulse conduction.**

- **Strong background in electromagnetic theory, high-voltage breakdown physics, pulse-power switching, magnetics, and fast-transient modeling.**

- **Proficiency with SPICE-based circuit modeling, MATLAB, and laboratory diagnostic equipment.**

- **Familiarity with ECAD/MCAD tools and prototype development workflows.**

Professional Skills

- **Exceptional analytical and problem-solving abilities.**
- **Strong written and verbal communication skills, including the ability to present complex research to technical and executive audiences.**
- **Demonstrated ability to work collaboratively across engineering, manufacturing, and leadership teams.**

Physical Demands and Work Environment

(Identical to existing HR language.)

Salary and Benefits

Competitive and commensurate with experience.