

**SBIR/STTR Fiscal Year 2011 Phase II Awards**  
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**TOPIC: Accelerator technology for the International Linear Collider**

**Company:**

Hyper Tech Research, Inc.  
539 Industrial Mile Road  
Columbus, OH 43228-2412

**Project Title:**

Short Period Model Helical Undulator for the ILC - Design and Demonstration

**Summary:**

The International Linear Collider (ILC), a pair of opposing electron and positron linear accelerators, needs to be supplied with electrons and positrons. The positrons are generated by pair-production in a metal target exposed to a high intensity photon beam. The required photon beam is generated by passing an electron beam through a succession of magnets with alternating polarities. This so-called "undulator" is to be constructed from magnets wound with an advanced highly stable Nb<sub>3</sub>Sn strand to be developed as part of proposed program.

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**Company:**

Far-tech, Inc.  
10350 Science Center Drive  
Building 14, Suite 150  
San Diego, CA 92121-1136

**Project Title:**

High Sensitivity Beam Position Monitors for 1300 MHz Cryomodules

**Summary:**

A beam profile monitor with high precision is being developed for the International Linear Collider. The International Linear Collider promises to provide new information on fundamental physics processes.

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**TOPIC: Advanced Coal Research****Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Avenue  
Lancaster, PA 17601-5606

**Project Title:**

Syngas Production by Thermochemical Conversion of H<sub>2</sub>O and CO<sub>2</sub> Mixtures Using a Novel Reactor Design

**Summary:**

This project uses CO<sub>2</sub> and H<sub>2</sub>O in a thermochemical cycle to efficiently produce syngas. The technology (i) does not require coal, methane or other hydrocarbon feedstocks (ii) can operate without catalysts, and (iii) can be scaled-up for production of fuels including syngas, methane and other hydrocarbon derivatives.

**Company:**

Eltron Research & Development Inc.  
4600 Nautilus Court South  
Boulder, CO 80301-3241

**Project Title:**

A Compact Integrated System for Air Capture of Atmospheric CO<sub>2</sub>

**Summary:**

Although CO<sub>2</sub> is considered an undesirable emittant from power plants and other facilities, developing the ability to exploit it first requires its capture. The proposed Phase I addresses the capture of atmospheric levels of CO<sub>2</sub> with concomitant electrochemical reduction.

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**TOPIC: Advanced Concepts and Technology for High Energy Accelerators****Company:**

Euclid Techlabs, LLC

5900 Harper Rd. #102  
Solon, OH 44139-1866

**Project Title:**

Development of a Dielectric-Based Short RF Pulse Two Beam Accelerator Prototype Module

**Summary:**

This project will investigate a new approach to realize a high energy collider beyond the Large Hadron Collider (LHC) era, which may lead to a low cost, high efficiency, high energy machine.

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**Company:**

Tech-x Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Project Title:**

Rapid Low-Noise Simulation of Ultra-bright 10 GeV Electron Bunches in Laser Plasma Accelerators

**Summary:**

Future generation high-energy particle accelerators, used to study the fundamental nature of matter, will likely include plasma-based components. Existing software is being enhanced to enable the accurate simulation and design of such devices.

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**STTR Project**

**Company:**

Muons, Inc.  
552 N. Batavia Ave  
Batavia, IL 60510-1274

**Project Title:**

Epicyclic Helical Channels for Parametric Resonance Ionization Cooling

**Summary:**

A beam cooling technique is being developed that uses resonances in a special magnetic channel to focus muon beams onto a series of thin metal wedges. The small muon beams generated by this technique will allow very high-luminosity muon colliders for the energy frontier.

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**Company:**

Polaronyx, Inc.  
2526 Qume Drive  
Suites 17 & 18  
San Jose, CA 95131-1870

**Project Title:**

Compact 2 micron High Power Femtosecond Fiber Laser

**Summary:**

A femtosecond fiber laser system will be developed for next generation HEP accelerator application. It will enable high repetition rate, high quality, compact, and low cost high energy study.

---

**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Project Title:**

High Current Density, Long Life Cathodes for High Power Sources

**Summary:**

Extension of controlled porosity, reservoir cathodes will allow development of higher power RF sources at reduced cost. This will decrease the cost of future accelerator and collider systems while providing higher performance.

---

**Company:**

Omega-p, Inc.  
258 Bradley Street  
New Haven, CT 06510-1106

**Project Title:**

High Current Cathode Cathode Employing Diamond and Related Materials

**Summary:**

Vacuum electronics devices used to power particle accelerators for discovery science and industrial applications, but also television transmitters and radar tubes, almost always employ thermionic cathodes, having limited current capability and requiring ancillary heating power. Cold cathodes to be developed and demonstrated in this project appear to offer higher current density, without need for heating power, thus improving device performance with lower operating cost and longer lifetime.

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**Company:**

Radiabeam Technologies, LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

**Project Title:**

Gated Field Emission Cathode RF Gun

**Summary:**

This project will develop a new type of electron gun based on advances in nanotechnology. The gun would have applications in research, cancer therapy, cargo inspection, and industrial irradiation.

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## **TOPIC: Advanced Diagnostic Techniques for Electricity Systems**

### **Company:**

Intelligent Fiber Optic Systems Corporation  
2363 Calle Del Mundo  
Santa Clara, CA 95054-1008

### **Project Title:**

Highly Multiplexed, Low Cost Fiber-Optic Sensor Array for Underground Cables Condition Monitoring

### **Summary:**

Catastrophic failures (e.g., the 2003 northeast blackout) are crippling and costly. On-line condition monitoring is needed for our aging underground power cables. Fiber optics is a cost-effective functional solution. It is immune to interference, allows multiplexed sensor types on the same fiber cable, and can deliver signals over many miles.

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### **Company:**

Underground Systems, Inc.  
84 Business Park Drive  
Suite 109  
Armonk, NY 10504-1734

### **Project Title:**

Underground Cable Advanced Diagnostics

### **Summary:**

This project will leverage over 20 years of technology and applications experience in underground cable monitoring and diagnostics to implement the design of an advanced diagnostic system that increases the reliability and utilization of the underground transmission system. This would be accomplished in cooperation with a major U.S. utility.

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## **TOPIC: Advanced Energy Storage**

### **Company:**

Brayton Energy, LLC  
75 B Lafayette Road  
Hampton, NH 03842-2624

**Project Title:**

Modular Undersea Compressed Air Energy Storage (UCAES) System

**Summary:**

The proposed utility-scale energy storage system using compressed air is shown to improve grid management of renewable and base-load resources. This project will launch a solar-assisted energy storage pilot plant in Hawaii.

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**TOPIC: Advanced for Subcomponents Critical to Electric Drive Vehicle Power Inverters and Motors****Company:**

Materials And Electrochemical Research (mer) Corpo  
7960 S. Kolb Road  
Tucson, AZ 85756

**Project Title:**

A Low Cost Continuous Process to Produce Magnet Alloys

**Summary:**

Reducing the cost of a critical component leading to expanded use of electrical vehicles, reduces pollution and the necessity to import oil which benefits the whole Nation. Neodymium-iron magnets have many uses in addition to electrical vehicles including wind generation of electricity as well as in many defense applications.

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**TOPIC: Advanced Solar Technology****Company:**

Spire Corporation  
One Patriots Park  
Bedford, MA 01730

**Project Title:**

Next Generation, LED-based, Adjustable Spectrum, Pulsed Solar Simulator

**Summary:**

Commercial lamp-based sun-simulators need high voltages, are not spectrally adjustable and degrade with time. The proposed new light emitting diode (LED) simulators operate at low voltage and low power, are size-scalable, electronically spectrum-adjustable, have lower cost and longer operating life.

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**Company:**

Colnatec LLC  
511 W. Guadalupe Road, Suite 23  
Gilbert, AZ 85233

**Project Title:**

Self-Cleaning Process Control Sensor for Thin-Film Solar Cell Manufacturing

**Summary:**

A state of the art processing sensor for the manufacture of thin film solar cells is proposed. This new sensor will eliminate many of the defects in existing technology and offer significant cost savings in solar cell production

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**Company:**

Spire Corporation  
One Patriots Park  
Bedford, MA 01730

**Project Title:**

Photoluminescence for Solar Cell Crack Detection

**Summary:**

Microcrack defects in solar cells will be detected using a noncontact photoluminescent technique that will lead to improved solar module quality and lifetime, thus decreasing the cost of solar energy generation.

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**TOPIC: Advanced Sources for Accelerator Facilities****Company:**

Busek Co. Inc.  
11 Tech Circle  
Natick, MA 01760-1023

**Project Title:**

High Current Negative Hydrogen Ion Source

**Summary:**

Busek Co. Inc. and Worcester Polytechnic Institute are leveraging over two decades of plasma thruster development for space propulsion by applying this technology in a state-of-the-art high current negative ion source. The completed source will allow researchers at Spallation Neutron Source Facility at ORNL achieve scientific advancements beyond current capabilities.

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## **TOPIC: Advanced Technologies and Materials for Fusion Energy Systems**

### **Company:**

Luna Innovations Incorporated  
1 Riverside Circle  
Roanoke, VA 24016

### **Project Title:**

Laser Vibrometer PFC Health Monitoring System

### **Summary:**

An enabling technique for in-situ health monitoring of fusion reactor's plasma facing components is proposed to support current and future tokamak development (including ITER). This system will enable safe operation of these reactors, which in turn will reduce the US dependency on foreign oil while simultaneously reducing emission of green house gasses.

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### **Company:**

Composite Technology Development, Inc.  
2600 Campus Drive, Suite D  
Lafayette, CO 80026-3359

### **Project Title:**

Insulation Materials and Processes for Helium Penetrations

### **Summary:**

Materials and processes will be developed to provide electrical insulation for the helium penetrations and electrical terminations for magnets in the ITER fusion device. These areas of the system are non-uniform in shape, and specific processes must be developed to ensure the overall reliability of the system.

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### **STTR Project**

#### **Company:**

Supercon, Inc.  
830 Boston Turnpike  
Shrewsbury, MA 01545-3386

#### **Project Title:**

Development of High Current 2G High Temperature Superconductor Cabling Technology

#### **Summary:**

This project attempts to develop a new superconducting cable in order to attain the high magnetic fields required for several energy related applications.

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## **TOPIC: Advanced Technology for Nuclear Energy**

**Company:**

Analysis And Measurement Services Corporation  
AMS Technology Center  
9119 Cross Park Drive  
Knoxville, TN 37923-4505

**Project Title:**

Integrated System for Management of Cable Aging in Nuclear Power Plants

**Summary:**

This proposal offers to develop a new, state-of-the-art electrical cable condition monitoring system for nuclear power plants. This can help reduce unplanned reactor trips, reduce radiation exposure to plant personnel, shorten refueling outage times, and improve plant safety and economy.

---

**Company:**

Analysis And Measurement Services Corporation  
AMS Technology Center  
9119 Cross Park Drive  
Knoxville, TN 37923-4505

**Project Title:**

Prognostic Methods for Predicting Remaining Useful Life of Nuclear Plant Equipment and Components

**Summary:**

Nuclear weapons tests, even underground, invariably release radioactive xenon gas into the atmosphere. By developing a more sensitive, easier to use method to detect this xenon, our proposed instrument will support and improve national and international efforts to detect, confirm, and deter tests of nuclear weapons.

---

**Company:**

Lambda Instruments, Inc.  
840 University City Blvd  
Suite 4  
Blacksburg, VA 24060-2708

**Project Title:**

Accident Condition Temperature Monitoring up to 1600°C in Gen-IV Reactors using Sapphire Fiber Optic Sensors

**Summary:**

Next generation nuclear reactors will operate at extremely high temperatures and thus require significant advancements in instrumentation to ensure adequate safety monitoring and control. The proposed work represents a breakthrough in the state-of-the-art in high temperature instrumentation and will provide an enabling technology for these reactors.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472

**Project Title:**

Solid State Sensor to Directly Replace Coils for Improved Eddy Current Testing

**Summary:**

This project will develop new, high sensitivity, solid-state sensors for rapid, high performance inspection of power plants, bridges, and transportation vehicles.

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**Company:**

Ceramic Tubular Products, LLC  
15815 Crabbs Branch Way  
Rockville, MD 20855-6636

**Project Title:**

Silicon Carbide Clad Thoria Plutonia Fuel for Light Water Reactors

**Summary:**

The new fuel clad technology to be developed in this project will make future nuclear fuel resistant to damage, and major radioactivity release, even when subjected to very severe accidents such as occurred during the recent earthquake – tsunami at Fukushima.

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**TOPIC: Advanced Thermoelectric Technologies****STTR Project****Company:**

Nanosonic, Inc.  
158 Wheatland Drive  
Pembroke, VA 24136

**Project Title:**

Bulk Thermoelectric Materials

**Summary:**

Thermoelectric (TE) materials allow low-grade heat (waste heat) to be converted to electrical energy. Advances made in this DOE program will result in the technical advancement and commercialization of a low-cost nanostructured composite thermoelectric device.

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**Company:**

Plasma Controls, LLC

1180 La Eda Ln  
Fort Collins, CO 80526

**Project Title:**

Thermoelectric Module for Waste Heat Recovery

**Summary:**

This project will develop and demonstrate a new method to produce wind turbine blade spars. This will improve long term performance and reliability of wind blades and reduce their manufacturing cost. Together these things will contribute to the safe, rapid expansion of the wind energy industry in the US.

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**TOPIC: Advanced Turbine Technology for IGCC Power Plants**

**STTR Project**

**Company:**

UES, Inc.  
4401 Dayton-Xenia Road  
Dayton, OH 45432-1894

**Project Title:**

High Temperature Unique Low Thermal Conductivity Thermal Barrier Coating (TBC) Architectures

**Summary:**

Gas turbine engines utilized in electric power production and aircraft propulsion need to operate at higher temperatures for enhanced efficiency and lower emission. Development of the proposed thermal barrier coating technology with unique architectural design will enable the operation of turbine engines at higher operating temperature.

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**TOPIC: Ancillary Technology for Accelerator Facilities**

**STTR Project**

**Company:**

Idesta Quantum Electronics  
435 Route 206 N  
Newton, NJ 07860-6005

**Project Title:**

Femtosecond Timing Distribution and Control for Next Generation Accelerators and Light Sources

**Summary:**

The company is going to implement a fs-laser based optical timing distribution system at the Stanford Linear Coherent Light Source (LCLS). The new system will enable new sets of experiments in chemical and material science depending on increased temporal resolution and also improve the performance of the LCLS itself.

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**Company:**

Tech-x Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Project Title:**

Accelerating Large-Scale Beam Dynamics Simulations with GPUs

**Summary:**

Accelerator-based light sources are among the largest and most advanced scientific instruments used by the DOE-funded researchers. This project will develop GPU-accelerated computational modeling tools that will significantly reduce the time and cost of producing optimal designs for the new, or upgrading the existing, light sources in the DOE portfolio.

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**TOPIC: Atmospheric Measurement Technology****Company:**

Luminit, LLC  
1850 West 205 Street  
Torrance, CA 90501-1526

**Project Title:**

Holographic A-band Multi-Channel Substrate Guided Wave-Based Spectrometer

**Summary:**

A low-cost moderate-to-high resolution miniature spectrometer with a stable single monolithic optical element that has dispersing and imaging capabilities and a linear image sensor will be developed for oxygen A-band spectrum monitoring. The resulting cost effective, easily maintained, lightweight highly efficient devices can be widely deployed will monitor climate change.

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**Company:**

Aerosol Dynamics, Inc.  
935 Grayson Street  
Berkeley, CA 94710-2640

**Project Title:**

An Ultrafine Focusing System for Atmospheric Aerosols

**Summary:**

Understanding sources and global concentrations of particles is a critical component to evaluating anthropogenic influences on global climate. This research will enable the more accurate measurement of one component of these particles, namely secondary organic compounds which contribute to particle formation in the atmosphere, and may play a significant role in production of those particles that seed the formation of clouds.

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**STTR Project****Company:**

Droplet Measurement Technologies  
2545 Central Avenue  
Boulder, CO 80301-2865

**Project Title:**

Mobile Ice Nucleus Counter

**Summary:**

Research on the nucleus that leads to ice cloud particles is severely hampered by the lack of instrumentation to measure aerosol particles which can produce ice clouds. In this effort instrumentation will be developed that will allow scientists to gain new understanding of ice clouds.

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**Company:**

Aerodyne Research, Inc.  
45 Manning Road  
Billerica, MA 01821-3976

**Project Title:**

High Sensitivity SO<sub>2</sub> Monitor using Quantum Cascade Laser IR Absorption

**Summary:**

To better understand aerosol formation and thus radiative forcing, easily deployed SO<sub>2</sub> instrumentation is needed. We have demonstrated a novel instrument for sulfur dioxide and propose to build a Phase II prototype to directly measure SO<sub>2</sub> and help elucidate sulfur-cloud and sulfate aerosol processes in the atmosphere.

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**Company:**

Aerodyne Research, Inc.  
45 Manning Road  
Billerica, MA 01821-3976

**Project Title:**

Chemical Ionization Time-of-Flight Mass Spectrometer for Particle and Gas-Phase Organic Speciation

**Summary:**

Small airborne particles generated from energy-related activities can adversely impact global climate, human health, and visibility. This project will develop an instrument with unique capabilities for identifying and measuring the mass loading and chemical composition of aerosol particles, leading to a better understanding of the sources, transformations and fates of atmospheric particulate matter.

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**TOPIC: Carbon Cycle Measurements of the Atmosphere and the Biosphere****Company:**

Aerodyne Research, Inc.  
45 Manning Road  
Billerica, MA 01821-3976

**Project Title:**

Dual Quantum Cascade Laser System For Simultaneous Measurements of  $^{13}\text{CH}_4$  and  $\text{CH}_3\text{D}$  Methane Isotopologues

**Summary:**

Methane is the second most important greenhouse gas contributing to global warming. This project will produce a laser based isotopic methane monitor that will be used to quantify the various sources of atmospheric methane based on their distinct isotopic signatures in order to assess the impact of methane on global warming and climate change.

**Company:**

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Atmospheric Observing Systems, Inc.  
1930 Central Avenue  
Suite A  
Boulder, CO 80301-2895

**Project Title:**

The Photo-Pneumatic  $\text{CO}_2$  Analyzer for Robotic Platforms

**Summary:**

New technology is needed to aid in the prediction of climate change, validate the  $\text{CO}_2$  satellite and monitor pollution of the urban environment. The  $\text{CO}_2$  Radiosonde will be combined with the standard meteorological Radiosonde to serve those functions and to launch the Radiosonde Utility of North America.

**Company:**

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Southwest Sciences, Inc.  
1570 Pacheco St.  
Suite E11  
Santa Fe, NM 87505-3993

**Project Title:**

Self-calibrating Balloon-Borne Methane Gas Sensor

**Summary:**

Current instruments for measuring greenhouse gases in the atmosphere, critical to understanding the greenhouse effect and global warming, are much too large, complex and expensive for widespread use on weather balloons for large scale measurements. Southwest Sciences will develop a lightweight, inexpensive sensor suitable for these balloon measurement.

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**Company:**

Vista Photonics, Inc.  
67 Condesa Road  
Santa Fe, NM 87508

**Project Title:**

Trace Carbon Monoxide Analyzer

**Summary:**

A field deployable sensor to monitor atmospheric concentrations of the critical indirect greenhouse gas carbon monoxide will be developed. It will have significant advantages when compared to existing technology.

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**Company:**

Vista Photonics, Inc.  
67 Condesa Road  
Santa Fe, NM 87508

**Project Title:**

Atmospheric Methane Analyzer

**Summary:**

A cost-effective field deployable sensor to monitor atmospheric concentrations of the critical greenhouse gas methane will be developed. It will have significant advantages when compared to existing technology.

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**TOPIC: Catalysis****Company:**

Exelus, Inc.  
110 Dorsa Avenue  
Livingston, NJ 07039-1003

**Project Title:**

## Low Temperature Oxidation of Alkanes to Alcohols

### **Summary:**

This SBIR project will develop a new, cost-effective method for converting abundant, low quality natural gas into methanol which can then be used to make a host of products such as transportation fuels and petrochemicals. It uses new chemistry and catalysts to improve energy efficiency while cutting capital costs by half or more.

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### **Company:**

Tda Research, Inc.  
12345 W. 52nd Ave.  
Wheat Ridge, CO 80033-1916

### **Project Title:**

Biomass Deconstruction and Catalytic Conversion to Fuel

### **Summary:**

World food shortages may significantly escalate price of U.S. grain, and market forces alone may make it extremely difficult to sustain production of fuel ethanol from corn. We are developing a new homogeneous catalytic process that allows ethanol to be made from synthesis gas produced by gasification of all types of renewable, non-food, biomass.

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### **STTR Project**

#### **Company:**

Dioxide Materials DBA Dioxide Recycle  
2021 S. First St.  
Suite 206  
Champaign, IL 61820-7477

#### **Project Title:**

Catalysis of CO<sub>2</sub> Conversion into Useful Chemicals

#### **Summary:**

This project will develop a process to recycle carbon dioxide back to useful chemicals, thereby reducing the carbon footprint of the chemical industry, and making it easier for the nation to meet our global warming goals. It will also create a US source for an important chemical used by the agriculture industry, replacing imports with a low cost domestic product.

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## **TOPIC: Climate Control Technology for Fossil Energy Application**

### **Company:**

Aspen Aerogels, Inc.  
30 Forbes Road, Bldg B  
Northborough, MA 01532

**Project Title:**

Superhydrophobic Aerogel as Sorbent Material for CO<sub>2</sub> Capture

**Summary:**

This project will develop a novel CO<sub>2</sub> capture technology for coal fired power plants. The novel aerogel based sorbent will 1) effectively remove the CO<sub>2</sub> from post combustion flue gas, 2) will be regenerated at low temperature, and 3) will be suited for multiple-cycle use. The new developed technology will enable to retrofit the existing fleet of coal-fired power plants for carbon capture and minimize global warming caused by greenhouse gas emissions.

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**Company:**

Intelligent Optical Systems, Inc.  
2520 W. 237th Street  
Torrance, CA 90505-5217

**Project Title:**

Distributed Sensors for Dissolved Carbon Dioxide

**Summary:**

Reliable and cost-effective monitoring is important to making gas sequestration an acceptable method of carbon dioxide control. These sensor cables, whose lengths respond to carbon dioxide, are the most reliable and economical way to detect carbon dioxide leaks into the groundwater near storage locations.

---

**Company:**

United Environment & Energy LLC  
111 Ridge Road  
Horseheads, NY 14845-1507

**Project Title:**

High Value Renewable Chemical Production from CO<sub>2</sub> and Biodiesel Plant Byproduct

**Summary:**

This project uses CO<sub>2</sub> and H<sub>2</sub>O in a thermochemical cycle to efficiently produce syngas. The technology (i) does not require coal, methane or other hydrocarbon feedstocks (ii) can operate without catalysts, and (iii) can be scaled-up for production of fuels including syngas, methane and other hydrocarbon derivatives.

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**TOPIC: Coal Gasification Technologies****Company:**

Reaction Engineering International  
77 West 200 South

Suite #210  
Salt Lake City, UT 84101-3601

**Project Title:**

A Technology to Mitigate Syngas Cooler Fouling

**Summary:**

This project will develop a boiler cleaning technology tailored for use in coal gasification plants. The proposed technology will improve the reliability and efficiency of coal gasification plants, thereby reducing US dependence on foreign energy sources and greenhouse gas emissions.

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**TOPIC: Collaboration, Scientific Visualization and Data Understanding**

**Company:**

Physical Optics Corporation  
20600 Gramercy Place, Bldg. 100  
Torrance, CA 90501

**Project Title:**

Large-Format Autostereo Volume Integrating Synthetic Holographic 3D Visualization System

**Summary:**

To meet the need for advanced scientific visualization systems, a multiuser viewable large-format 3D display system will be developed for collaborative data analysis and visualization of scientific data produced by computer simulations and experiments.

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**TOPIC: Cyber-Security and Networking**

**Company:**

Acadia Optronics LLC  
1395 Piccard Dr, Suite 210  
Rockville, MD 20850

**Project Title:**

100 Gb/s Pattern Generator and Comparator

**Summary:**

This project will develop a compact, low-cost testing system to accelerate the deployment of ultra-fast 40/100 Gb/s next-generation networks and services.

---

**Company:**

Cpacket Networks Inc.

2061 Landings Drive  
Mountain View, CA 94043

**Project Title:**

Cybersecurity and Networking: NIDS Front-End for Load Balancing at 100 Gigabits

**Summary:**

The project objective is to deliver a high speed frontend load balancer for Network Intrusion Detection in mission critical 100 Gbps networks. The front end load balancing aims to close the technology gap between existing solutions to the emerging cybersecurity needs at speeds that are expected to increase by order(s) of magnitude in the foreseeable future. The high speed front end balancing enables scalable cost effective solutions that can utilize clusters of off the shelf computers. NIDS clusters can be pervasively deployed to subvert intrusions and attacks.

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**Company:**

Reservoir Labs, Inc.  
632 Broadway Suite 803  
New York, NY 10012

**Project Title:**

Implementation of an Energy-Saving Bro-Aware Load Balancer at 100 Gbps with Closed-Loop Flow Policy Control

**Summary:**

The volume and sophistication of cyber attacks on nationally critical infrastructure and defense systems are growing, and beginning to overwhelm our existing cyber defenses. We propose to develop a cybersecurity-aware traffic load balancer to efficiently map traffic onto clusters of intrusion detection systems.

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**TOPIC: Energy Efficient Membranes for Industrial Applications**

**Company:**

Compact Membrane Systems, Inc.  
335 Water Street  
Newport, DE 19804-2410

**Project Title:**

Improved Hydrogen Purification

**Summary:**

This program will develop high performance and robust membranes for the purification of hydrogen in petrochemical and oil refining industries and power plants. The results of this program will facilitate the U.S. movement to the hydrogen economy and have quantifiable contributions to energy independence and carbon sequestration.

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**STTR Project****Company:**

T3 Scientific LLC  
1839 Noble Road  
Arden Hills, MN 55112-7834

**Project Title:**

High Surface Area-to-Volume Ultrathin Dense Membrane for Hydrogen Separation

**Summary:**

Providing a reliable, clean and economical energy source is a priority of the US government. This proposal is to develop a novel high surface area ultrathin dense membrane for the production of high-purity hydrogen from coal to support domestic and global green economy with near-zero emission.

---

**Company:**

Compact Membrane Systems, Inc.  
335 Water Street  
Newport, DE 19804-2410

**Project Title:**

Novel Membranes for Olefin/Paraffin Separation

**Summary:**

This project will reduce the cost of ethylene and propylene, two widely used chemicals in the plastics industry, with a return on investment of 67%, payback period of 1.3 years, and an energy savings of 40 trillion BTU/yr when used in a retrofit application.

---

**STTR Project****Company:**

Helios-nrg, LLC  
12 Yardley Lane  
East Amherst, NY 14051-1683

**Project Title:**

Advanced Membrane Technology for Helium Recover

**Summary:**

This project will develop a step change technology to produce high value helium from vast, but marginal, sources which are uneconomic today. This will revive declining US production, maintain US global leadership and help ensure reliable supply of this valuable and irreplaceable resource for decades to come.

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## **TOPIC: Fossil Energy Advanced Research**

### **Company:**

Wireless Sensor Technologies, LLC  
1020 Glen Arbor Drive  
Encinitas, CA 92024-2443

### **Project Title:**

A Self-Powered Wireless Sensor System for Power Generation Applications

### **Summary:**

This project will develop and demonstrate a high reliability waste heat-enabled power supply and wireless sensor system for power generation applications. The system consists of networked sensor nodes containing pressure and temperature sensors that may be used in gas turbine engines and other critical machines enabling condition-based maintenance for a power generation plants.

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## **TOPIC: Fusion Science and Technology**

### **Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2345

### **Project Title:**

Components for Heating and Fueling of Fusion Plasmas

### **Summary:**

This project will develop and deliver a unique prototype solid-state power system for driving fusion reactors. The new design will reduce hardware costs approximately 30% compared to currently available state-of-the-art systems.

---

### **Company:**

Plasma Processes, Inc.  
4914 Moores Mill Road  
Huntsville, AL 35811-1558

### **Project Title:**

Advanced ICRF Antennas for Fusion Energy Devices

### **Summary:**

Advanced coating techniques will be developed enabling the fabrication of more reliable, higher performance components for fusion energy devices.

---

**Company:**

Tech-x Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Project Title:**

Gyrotron Design and Evaluation using New Particle-in-Cell Capability

**Summary:**

Gyrotrons provide power to heat the ITER fusion experiment, but suffer from a poorly understood oscillation phenomenon that: a) disturbs their monitoring diagnostics, and b) could limit performance of more advanced designs. A recent breakthrough in one area of electromagnetic modeling can provide exactly the tool needed to investigate this problem with a more advanced technique.

---

**Company:**

Far-tech, Inc.  
10350 Science Center Drive  
Building 14, Suite 150  
San Diego, CA 92121-1136

**Project Title:**

Disruption Simulation Code for Tokamaks and ITER Applications

**Summary:**

The project will provide a breakthrough in tokamak numerical simulations and in the theoretical understanding needed to predict, avoid, and mitigate disruptions, which is arguably the most important issue in the successful development of tokamak-based magnetic fusion.

---

**STTR Project****Company:**

Eagle Harbor Technologies, Inc.  
Suite D3, #179  
321 High School Rd. NE  
Bainbridge Island, WA 98110-2648

**Project Title:**

Low-Impurity, Electrode-less Pre-ionizer Plasma Gun for Innovative Confinement Concepts

**Summary:**

The proposed work seeks to develop a high power, low-impurity plasma source to support fusion science research application in the effort to produce a clean and abundant energy source.

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**TOPIC: Genomic Science and Related Biotechnologies**

**STTR Project****Company:**

Glomics, Inc.  
716 Waterwood Dr.  
Norman, OK 73072-4369

**Project Title:**

Development of Novel Random Network Theory-Based Approaches to Identify Network Interactions Among Nitrifying Bacteria

**Summary:**

The development of novel ecological network approaches to characterize network interactions of microbial communities represents transformative advances in biological/environmental sciences, and this will greatly enhance the commercialization of GeoChip technologies, which was awarded as one of the 100 most technological innovations with the greatest commercial potentials in 2009.

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**TOPIC: Geothermal Energy Technology Development****Company:**

United Silicon Carbide, Inc.  
7 Deer Park Drive,  
Suite E  
Monmouth Junction, NJ 08852

**Project Title:**

High Temperature Smart Sensor for Downhole Logging and Monitoring

**Summary:**

The circuits and subsystems fabricated through this program will enable more sophisticated geothermal reservoir logging, as well as, natural gas and oil exploration. In addition, the underlying technologies will enable more efficient hybrid electric vehicles and electrical distribution systems.

---

**Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Avenue  
Lancaster, PA 17601-5606

**Project Title:**

Vortical-Flow, Direct-Contact Heat Exchanger for Geothermal Cooling

**Summary:**

Air conditioning represents 8% of energy consumed and greenhouse gases produced in the United States. This project will develop a heat exchanger to reduce this energy consumption while providing improved indoor air quality.

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### **TOPIC: High Energy Physics Detectors**

#### **Company:**

Arradiance, Inc.  
142 North Road  
Suite F-150  
Sudbury, MA 01776-1142

#### **Project Title:**

Efficient Manufacture of Extreme Surface Area Microchannel Plate Devices Functionalized by Atomic Layer Deposition Thin Films

#### **Summary:**

Efficient manufacture of extreme surface area Microchannel plate devices functionalized by atomic layer deposition nanofilms is an essential component of next generation high energy physics detector designs as well as novel detection applications in medical discovery and diagnostics and homeland security applications.

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### **TOPIC: High Performance Computing Systems**

#### **Company:**

Tech-x Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

#### **Project Title:**

Accelerating PETSc through Next-Generation Heterogeneous Supercomputing

#### **Summary:**

The DoE has invested heavily in the development of next-generation supercomputing facilities for scientific computation and discovery. Successful completion of this project will ensure that these resources can be used by the most general scientific audience.

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### **TOPIC: High Performance Materials for Nuclear Application**

#### **Company:**

Lambda Instruments, Inc.  
840 University City Blvd  
Suite 4  
Blacksburg, VA 24060-2708

**Project Title:**

In-Situ Mechanical Characterization of Refractory Materials up to 1600°C for Gen-IV Reactors Using Sapphire Fiber Optic Sensors

**Summary:**

Next generation nuclear reactors will operate at extremely high temperatures and thus require significant advancements in instrumentation to ensure adequate safety monitoring and control. The proposed work represents a breakthrough in the state-of-the-art in high temperature instrumentation and will provide an enabling technology for these reactors.

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**TOPIC: High-Field Superconductor and Superconducting Magnet Technologies for High Energy Particle Colliders**

**Company:**

Supercon, Inc.  
830 Boston Turnpike  
Shrewsbury, MA 01545-3386

**Project Title:**

High Strength Silver Sheath for Bi2212/Ag Conductor

**Summary:**

Advances in the technology of high temperature, high field superconductors is necessary for maintaining US leadership in the fields of materials science, biomaterials and high energy physics. New materials such as the silver-aluminum composite have a critical enabling role in the development of improved high performance, high temperature superconductors.

---

**STTR Project**

**Company:**

Ngimat Co.  
5315 Peachtree Boulevard  
Atlanta, GA 30341-2107

**Project Title:**

Thin Robust Electrical Insulator for High Field HTS Magnets

**Summary:**

This project addresses stability and high magnetic field enhanced thermal coating of high temperature superconductors. Thin, nanoceramic-based coatings will be applied to conductor

strands for electrical insulation and to improve thermal conduction. The technology is proposed to help increase minimum quench energy while enhancing quench detection, thus improving superconducting efficiency.

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## **TOPIC: High-Speed Electronic Instrumentation for Data Acquisition and Processing**

### **Company:**

Voxtel, Inc.  
15985 NW Schendel Avenue  
Suite 200  
Beaverton, OR 97006

### **Project Title:**

High-Resolution, High-Channel-Count Time-to-Digital Converter and Binary Pulse Processor

### **Summary:**

High-energy and nuclear physics, biomedical instrumentation (including PET imaging), and military LADAR imaging require time-interval processing at picosecond-scale resolution across a large number of channels. This program advances these goals in a low-cost, commercially available processing platform.

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## **TOPIC: Hydrogen Safety, Storage, Delivery, and Production**

### **Company:**

Fuelcell Energy, Inc.  
3 Great Pasture Rd  
Danbury, CT 06813-1305

### **Project Title:**

Thermally Integrated Solid State Hydrogen Separator and Compressor

### **Summary:**

This project focuses on the development of a dual purpose thermally integrated solid-state hydrogen separator and compressor to produce high pressure, high purity hydrogen to meet near term industria.

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## **TOPIC: Hydrogen, Fuel Cells, and Infrastructure Technologies Program**

### **Company:**

Proton Energy Systems

10 Technology Drive  
Wallingford, CT 06492

**Project Title:**

Low Cost Large Scale PEM Electrolysis for Renewable Energy Storage

**Summary:**

Proton Energy Systems manufactures hydrogen generation systems which can be integrated with renewable energy sources to generate hydrogen fuel while producing minimal carbon footprint. This project aims to reduce the cost of this technology through development of improved membrane and catalyst technology designed to reduce raw material cost and improve electrical efficiency..

---

**Company:**

HHC-SES JV, Inc.  
1544 N Woodland Park Drive STE 310  
Layton, UT 84041

**Project Title:**

Low Cost Metal Hydride Hydrogen Storage System for Forklift Applications

**Summary:**

The need for emission free forklift vehicles has resulted in over 50 yrs of battery powered systems (66,000 forklifts annually). Fuel cell forklift sales have been hampered due to cost and safety concerns associated with high-pressure hydrogen storage and fueling. The proposed metal hydride hydrogen storage design offers low pressure storage; providing the pathway for a dramatic increase in U.S. fuel cell forklifts as well as other material handling vehicle applications.

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**TOPIC: Imaging and Radiochemistry**

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472

**Project Title:**

Novel Concept in PET Imaging

**Summary:**

The proposed research will investigate a promising detector technology which will have major impact in scientific studies, health care, homeland defense, oil exploration as well as industrial applications.

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**TOPIC: Instrumentation and Tools for Materials Research Using Neutron Scattering****Company:**

Materials Development, Inc.  
3090 Daniels Court  
Arlington Heights, IL 60004-0001

**Project Title:**

Extreme Sample Environment for Beamline Research

**Summary:**

Advanced materials research using neutrons is critical in making technological advances in materials for energy, security and high performance data storage. This project is using DOE's neutron facilities to develop research instrumentation that impacts US capabilities in advanced materials, energy technology and manufacturing competitiveness.

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**TOPIC: Instrumentation for Electron Microscopy and Scanning Probe Microscopy****Company:**

Appliflex LLC  
PO Box 159293  
Nashville, TN 37215-9293

**Project Title:**

Laser In-Situ Diagnostics and Processing Probes for Electron Microscopes

**Summary:**

The assembly and fabrication of nanomaterials into useful structures and devices remains a grand challenge in nanotechnology. This project will develop a novel method and tool for processing, in-situ live imaging and characterization of materials at the nanoscale by combining laser technology with an electron microscope instrument.

---

**Company:**

Hummingbird Precision Machine Inc.  
8300 28th Ct NE, Unit 200/300  
Lacey, WA 98516-7126

**Project Title:**

Ultra-Low Drift Transmission Electron Microscopy In-Situ Heating Holder

**Summary:**

Exposure of materials to high temperatures can allow exploration of material changes or an improved understanding of the structure-property relations in materials. This proposed work will yield commercialized hardware that will allow scientists to more completely characterize such materials at nano-scale resolution in a transmission electron microscope.

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## **TOPIC: Instrumentation for Materials Research using Synchrotron Radiation**

### **STTR Project**

#### **Company:**

Royston Engineering Research LLC  
1025 West Vernon Park Place  
Unit A  
Chicago, IL 60607-3448

#### **Project Title:**

A New Paradigm for X-ray Optics Nanopositioning

#### **Summary:**

A novel X-ray optics positioning system will be developed having sub-nanometer resolution enabling orders of magnitude resolution improvement in materials research at synchrotron facilities, like Argonne's Advanced Photon Source. This in turn will lead to advances in commercial applications and products being pioneered by material science users of such facilities.

---

#### **Company:**

Jema Science, Inc.  
1530 Grand Ave.  
Piedmont, CA 94611-4330

#### **Project Title:**

Smart Combinatorial Research Equipment (SmartCoRE) for Automated Sample Analysis and Environmental Control on Synchrotron Beamlines

#### **Summary:**

Higher efficiency is needed to provide better access to expensive and high-demand analytical x-ray facilities. Automated sample conditioning and handling modules are being designed and commercialized to provide higher analytical throughput at these facilities.

---

#### **Company:**

Star Cryoelectronics, LLC  
25 Bisbee Court, Suite A  
Santa Fe, NM 87508-1338

#### **Project Title:**

## Advanced STJ-based X-Ray Spectrometer for Synchrotron Science Applications

### **Summary:**

The development of X-ray spectroscopy tools has lagged behind infrastructure advances at the Nation's synchrotron facilities. STAR Cryoelectronics proposes to build an advanced, turn-key X-ray spectrometer specifically for synchrotron science applications that is based on an array of superconducting tunnel junction (STJ) detectors and design development work completed during Phase I. The next-generation X-ray spectrometer will be cryogen-free with automated controls to simplify and streamline operation at synchrotron facilities and enhance research capabilities..

---

### **Company:**

Voxtel, Inc.  
15985 NW Schendel Avenue  
Suite 200  
Beaverton, OR 97006

### **Project Title:**

High Speed Germanium X-Ray Photon Counting Detector Array

### **Summary:**

Modern synchrotrons produce intense photon beams for science experiments, but available detectors can not fully measure the fluxes they produce. A technology platform is being developed to offer fast and highly functional photon counting detectors that more closely match the experimental output.

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## **TOPIC: Modeling and Simulation of Industrially-Relevant Problems**

### **Company:**

Combustion Research And Flow Technology, Inc.  
6210 Kellers Church Road  
Pipersville, PA 18947-2010

### **Project Title:**

Innovative Subgrid-Scale Combustion Modeling for Gas Turbines

### **Summary:**

An advanced turbulent combustion model will be developed under this program to support the development of new fuel-flexible gas turbine technologies. The model will include the physics required to accurately predict gas turbine operations and be efficient enough for engineering design analysis.

---

### **STTR Project**

#### **Company:**

Continuum Dynamics, Inc.

34 Lexington Avenue  
Ewing, NJ 08618-2302

**Project Title:**

Advanced Methods for Predicting 3D Unsteady Flows Around Wind Turbines

**Summary:**

This project will develop an entirely new class of multidisciplinary analysis software for predicting the aerodynamics, fatigue, vibration and noise of wind turbines. By improving the ability to design and predict the performance of wind turbines, this new software will help to increase the reliability and life span of wind turbines, reduce maintenance costs while minimizing our dependency on foreign energy supplies and reducing greenhouse gas and carbon emissions. .

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**TOPIC: Novel Membrane and Electrode Development for Advanced Electrochemical Energy Storage**

**Company:**

Amsen Technologies LLC  
1684 S. Research Loop, Suite 518  
Tucson, AZ 85710

**Project Title:**

Low-Cost, High-Performance Hybrid Membranes for Redox Flow Batteries

**Summary:**

This SBIR project will develop a low-cost, high performance hybrid membrane for redox flow batteries, which is a technology of significant potential for stationary electrical energy storage to be used with wind or solar power generation.

---

**Company:**

Eic Laboratories, Inc.  
111 Downey Street  
Norwood, MA 02062-2612

**Project Title:**

Low Cost and Highly Selective Composite Membrane for Redox Flow Batteries

**Summary:**

The development of highly economical components for redox flow batteries will provide cost effective energy storage of renewable resources and also impact the efficiency of the electrical energy transmission grid.

---

**Company:**

Lynntech, Inc.  
2501 Earl Rudder Freeway South  
College Station, TX 77845-6023

**Project Title:**

Highly Selective Proton-Conducting Composite Membranes for Redox Flow Batteries

**Summary:**

Development of low-cost and highly selective proton-conducting composite ion exchange membranes is a key step in the development of cost-effective and durable flow batteries for electrical energy storage. The development of this type of energy storage device has the potential to be used by the electric utility industry to facilitate efficient use of electricity generated from renewable energy sources, help reduce emissions, and contribute to energy independence.

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**TOPIC: Nuclear Physics Accelerator Technology**

**Company:**

Green Mountain Radio Research Company  
77 Vermont Avenue  
Colchester, VT 05446

**Project Title:**

Development of High-Efficiency Power Amplifiers for 704 MHz

**Summary:**

Accelerators used by DOE for nuclear-physics research require huge amounts of electrical power. The proposed grant will develop a high-efficiency power amplifier that is adaptable to many applications and will significantly reduce electricity consumption, thus reducing operating costs, importation of foreign petroleum, pollution, and greenhouse-gas emissions.

---

**STTR Project**

**Company:**

Niowave, Inc.  
1012 N. Walnut Street  
Lansing, MI 48906-5061

**Project Title:**

Development of an SRF Crab Crossing Cavity for an Electron Ion Collider

**Summary:**

This project will develop a new type of the superconducting deflecting cavity. This new accelerator technology can be successfully used to increase efficiency with many applications in both linear as well as circular accelerators of charged particle beams.

---

**Company:**

Far-tech, Inc.  
10350 Science Center Drive  
Building 14, Suite 150  
San Diego, CA 92121-1136

**Project Title:**

Quasi-3D Model of an Electron Cyclotron Resonance Ion Source

**Summary:**

This project will develop a sophisticated, numerical modeling tool that will decrease the cost of building and operating sources of highly charged ions that are used in nuclear physics research as well as industrial applications.

---

**Company:**

Scientific Solutions, Inc.  
11619 Chippenham Way  
San Diego, CA 92128-4281

**Project Title:**

Miniature Electron-Cyclotron Resonance (ECR) Ion Source for Industrial Applications and Research

**Summary:**

The purpose of this project is to develop and characterize a miniaturized electron-cyclotron resonance (ECR) ion source. The smaller size and reduced complexity is an enabling technology for portable accelerators used for border security and detection of explosives and special nuclear materials.

---

**Company:**

Saxet Surface Science  
3913 Todd Lane  
Suite 303  
Austin, TX 78744-1057

**Project Title:**

STRAW - A Hydrogen-Specific Pressure Gauge for XHV

**Summary:**

Many of the next generation of physics accelerators will require high average electron currents, a potential issue for electron sources. This program will develop a pressure measurement device that allows routine use of better vacuum to protect these electron sources from ion damage.

---

**Company:**

Tech-x Corporation  
5621 Arapahoe Ave

Boulder, CO 80303-1379

**Project Title:**

GPU Acceleration of Spin Tracking in Colliding Beam Accelerators

**Summary:**

Fundamental advances in experimental nuclear physics will require cost-efficient acceleration of intense polarized particle beams. Well-tested software is being enhanced to enable quantitative simulation and design of these next-generation particle accelerators.

---

**Company:**

Innosense LLC  
2531 West 237th Street  
Suite 127  
Torrance, CA 90505-5245

**Project Title:**

Carbon Aerogels - Hot Catchers for Exotic Isotopes and/or Molecular Species

**Summary:**

This SBIR project aims to develop and demonstrate refractory carbon aerogels as catchers for the efficient production of rare isotopes of single-species molecular vapors. This project will support the DOE-FRIB Program objectives to promote understanding of how stars explode or how elements from iron to uranium are created.

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**TOPIC: Nuclear Physics Electronics Design and Fabrication**

**Company:**

American Semiconductor, Inc.  
3100 S Vista Ave Ste 230  
Boise, ID 83705

**Project Title:**

FlexPix SOI Pixel Detectors for Next Generation Imagers

**Summary:**

This project will advance US capabilities for high performance, low power, low cost detectors for x-rays and high energy particles. These advances will improve early cancer detection and treatment, homeland security screening, and high energy physics research using US semiconductor capability.

---

**Company:**

Voxtel, Inc.  
15985 NW Schendel Avenue

Suite 200  
Beaverton, OR 97006

**Project Title:**

SOI CMOS Process for Monolithic, Radiation-Tolerant, Science-grade Imagers

**Summary:**

A domestic source of radiation-tolerant, high-performance imagers will be made available, allowing scientific and military imagers to be made cost-effectively in established CMOS fabs.

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**TOPIC: Nuclear Physics Instrumentation, Detection Systems and Techniques**

**Company:**

Phds Co.  
3011 Amherst Road  
Knoxville, TN 37921

**Project Title:**

Growth of Large Diameter High-Purity Germanium Crystals for Nuclear Physics Research

**Summary:**

The DOE Office of Nuclear Physics requires larger, more sensitive and lower cost detectors for identification and location of gamma rays in Nuclear Physics experiments. The large germanium crystals developed here will provide far better detectors for Nuclear Physics measurements and the detection of radioactive materials in general.

---

**Company:**

Aspen Aerogels, Inc.  
30 Forbes Road, Bldg B  
Northborough, MA 01532

**Project Title:**

Manufacturing of Large and Highly Transparent Aerogel Tiles with Refraction Index up to 1.1 for Cherenkov Detectors

**Summary:**

This project will domestically produce highly transparent aerogel detectors for Cherenkov radiation particle detectors. The aerogel will provide the high-energy physics community with an improved particle detection capability and will enable a U.S. manufacturer to supply this strategic market. .

---

**STTR Project**

**Company:**

Sinmat, Inc.

2153 SE Hawthorne Road  
Suite 124, Box 2  
Gainesville, FL 32641-7553

**Project Title:**

Defect Free, Ultra-Rapid Thinning/Polishing of Diamond Crystal Radiator Targets (20??m) for Highly Linearly Polarized Photon Beams

**Summary:**

This project will develop a novel technology to produce special diamond crystals that can be used in nuclear reactors, and next generation computer devices.

---

**Company:**

Agiltron, Inc.  
15 Cabot Road  
Woburn, MA 01801

**Project Title:**

Micromegas Particle Detector

**Summary:**

The proposed micromegas particle detectors will reduce costs and time to obtain results in experiments physics aimed to answer the question: how is the universe put together? The micromegas to be developed in this program will also have use in vital national interest of detecting nuclear threats.

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**TOPIC: Oil and Gas Technologies**

**Company:**

Abs Materials Inc.  
770 Spruce Street  
Wooster, OH 44691

**Project Title:**

Removal of Dissolved Organics From Flow Back Waters Using Swellable Organosilica

**Summary:**

This project will develop water treatment technologies to remove organic contaminants from water created during hydraulic fracturing operations so such water can be safely recycled or discharged.

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**TOPIC: Production of Biofuels from Cellulosic Biomass**

**STTR Project****Company:**

Compact Membrane Systems, Inc.  
335 Water Street  
Newport, DE 19804-2410

**Project Title:**

Energy efficient process for solvent extraction of oil from microalgae using green solvents

**Summary:**

Algae oil is an attractive source of renewable energy. Extraction & separation of algae oil is a major cost component of algae oil production. This project will develop a highly economical membrane separation process to reduce the extraction & separation costs of algae oil. This will improve the economics of algae oil production and make algae oil a viable alternative to fossil fuels.

---

**Company:**

Phycal, Inc.  
51 Alpha Park  
Highland Heights, OH 44143

**Project Title:**

Solid Phase Lipid Extraction of Algal Oil

**Summary:**

This project completes the development of an improved method of algal lipid recovery and other hydrophobic compounds from algae. Such a method will reduce the overall cost per gallon of the algal oil which will be a feedstock for advanced renewable biofuels.

---

**Company:**

Synaptic Research LLC  
1448 South Rolling Road  
Baltimore, MD 21227

**Project Title:**

Enhanced Process for Extraction and Purification of Oil from Microalgae Using CO<sub>2</sub> as a Solute

**Summary:**

Biodiesel from algae represents an important renewable energy alternative, but the costs for obtaining biofuels from algae are currently prohibitively expensive. This small business project will apply a novel chemical processing technology to extract oil from algae and make this renewable fuel commercially viable and competitive with other energy sources.

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**TOPIC: Radiation Detection**

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472

**Project Title:**

Novel Polycrystalline Scintillators for Nuclear Non-Proliferation

**Summary:**

The proposed research will investigate promising nuclear detector designs that will have major impact in nuclear non-proliferation, medical imaging, scientific studies as well as commercial applications.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472

**Project Title:**

Growth of Semiconductors for Room Temperature Gamma-Ray Detection

**Summary:**

High performance gamma-ray detectors that operate at room temperature are critical to many applications including detection and identification of special nuclear materials. This project will develop a low cost, high performance detector material that operates at room temperature.

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**TOPIC: Radio Frequency (RF) Devices and Components for Accelerator Facilities****Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Project Title:**

Multi-kW CW S-Band PPM Klystron

**Summary:**

This project will develop a 10 kW S-band CW klystron. The advanced design of this klystron offers system costs that are significantly lower than those possible with conventional CW klystrons. This S-band will be useful for research and medical accelerators, and national defense and commercial applications.

---

**STTR Project****Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Project Title:**

High Power RF Windows for Accelerator Applications

**Summary:**

This program will investigate improved methods for protecting RF windows from catastrophic failures that result in significant costs for the microwave power and high energy physics community. This will increase the power capability of a critical component in these devices.

---

**Company:**

Nokomis, Inc.  
310 5th St.  
Charleroi, PA 15022-1517

**Project Title:**

Novel Coating Materials for RF Windows

**Summary:**

This project will develop an innovative method to improve accelerator efficiency and assist with high-energy physics research. Building upon expertise in radio frequency applications and materials, the company will develop window materials that allow for greatly improved power handling capability.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2345

**Project Title:**

Robust High-Average-Power Modulator

**Summary:**

This effort will correct the functioning of DOE modulators that deliver short electrical pulses, but do not yet meet full specifications despite ten years of development. A new modulator that meets the specifications, is inherently reliable, and is 2/3 the cost will be designed.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2345

**Project Title:**

Solid-State Pulsed Power System for a Stripline Kicker

**Summary:**

The DOE is looking for a pulser to enable the precise kicker needed to handle desired bunch spacing and energy deflection of electron beams. This project will build a custom module to be arranged in an array, which can fulfill the specifications of a kicker required for particle deflection.

---

**Company:**

Mtech Laboratories, LLC  
831 Rte. 67, Bldg. 45C  
Ballston Spa, NY 12020-0227

**Project Title:**

Novel Switching Devices for Accelerator Modulators

**Summary:**

This project addresses very high power switches for accelerators used in high-energy physics and particle research, which seeks to broaden our understanding of fundamental physical properties. The proposed program will develop novel, high-voltage, high-current devices with much faster switching times, improved efficiency, and higher reliability.

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**TOPIC: Radio Frequency Accelerator Technology for High Energy Accelerators and Colliders****Company:**

Haimson Research Corporation  
3350 Scott Boulevard  
Building 60  
Santa Clara, CA 95054-3104

**Project Title:**

Design, Fabrication, and High Gradient Testing of a 17 GHz Linac Structure having Brazen Molybdenum Iris Surfaces

**Summary:**

The enhancement of accelerating gradient would significantly advance radio-frequency linear accelerator technology and would have a positive impact on the design of future linear colliders and accelerators for commercial applications.

---

**Company:**

Omega-p, Inc.  
258 Bradley Street  
New Haven, CT 06510-1106

**Project Title:**

High-Gradient Two-Beam Electron Accelerator

**Summary:**

A high-energy electron-positron collider is believed by members of the scientific community to be one of the next “big science” projects requiring intellectual and financial support from governments on an international scale. Technical improvements, such as that proposed here, have the potential to reduce the cost and complexity of a future collider, thus making it more appealing to those responsible government bodies.

---

**Company:**

Euclid Techlabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Project Title:**

Development of a 12 GHz Dielectric-Based Wakefield Power Extractor for Potential Clic Applications

**Summary:**

Dielectric based high power rf generator offers the possibility of reduced cost and higher efficiency for applications in the next generation high energy physics machine, as well as industry, medicine, and scientific research. We propose to develop such a device to meet the particular requirements of the Compact Linear Collider, which is the high energy physics machine under design with joint effort of Europe and US.

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**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2345

**Project Title:**

Short Pulse Marx Modulator Optimization for Advanced Accelerators

**Summary:**

Modulators to drive klystron tubes for developing accelerator facilities must meet aggressive requirements for pulse risetime, flatness, and repeatability requirements, at hundreds of kV. In this proposal we will advance our modulator design developed in Phase I from a prototype to a fully functional, installed system for the 500 kV operation of a magnicon tube.

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**TOPIC: Remote Sensing****Company:**

Physics, Materials, And Applied Mathematics Resear

1665 E. 18th Street, Suite 112  
Tucson, AZ 85719

**Project Title:**

Integrated Filament-Induced Breakdown Spectroscopy Sensor for Standoff Detection of Radiological Materials

**Summary:**

This project will develop an integrated sensor capable of detecting nuclear and other sensitive materials at long range. This sensor will be compact and portable, an improvement over current techniques to detect nuclear materials. This benefits nuclear non-proliferation, enhances national security, and reduces risk to military personnel deployed on site.

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**Company:**

Voxtel, Inc.  
15985 NW Schendel Avenue  
Suite 200  
Beaverton, OR 97006

**Project Title:**

Large-Format, Fully Depleted, Back-Illuminated CMOS Imaging Technology

**Summary:**

To meet the nation's low light level imaging and persistent surveillance needs, a domestic source of large-area, high-pixel-density imagers is being developed with superior nighttime sensitivity.

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**TOPIC: Research to Support Nuclear Explosion Monitoring**

**Company:**

Xia, LLC  
31057 Genstar Road  
Hayward, CA 94544-0000

**Project Title:**

Silicon Detectors for High Resolution Radioxenon Measurements

**Summary:**

Nuclear weapons tests, even underground, invariably release radioactive xenon gas into the atmosphere. By developing a more sensitive, easier to use method to detect this xenon, our proposed instrument will support and improve national and international efforts to detect, confirm, and deter tests of nuclear weapons.

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**Company:**

Rocky Mountain Geophysics, Inc.

167 Piedra Loop  
Los Alamos, NM 87544-3836

**Project Title:**

Development of Mine Explosion Ground Truth Smart Sensors

**Summary:**

A Ground-Truth Monitoring System is being developed to provide calibration data for seismic monitoring of nuclear explosions and will improve U.S. monitoring capabilities. The system consists of smart sensors placed close to large mining regions and using adaptive signal processing techniques, automatically transmits key parameters of location, origin time and magnitude to a central processing facility.

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**TOPIC: Site Remediation and Deactivation & Decommissioning in the DOE Complex**

**Company:**

Los Gatos Research  
67 East Evelyn Avenue Suite 3  
Mountain View, CA 94041

**Project Title:**

Lab-on-a-chip Technology for in-situ Mercury Speciation Characterization

**Summary:**

New technologies are urgently needed for long-term and continuous monitoring of contaminants in the subsurface environment. The proposed novel technology provides the required sensitivity and selectivity, thus provides just such a means to accomplish this goal.

**Company:**

Mainstream Engineering Corporation  
200 Yellow Place  
Rockledge, FL 32955

**Project Title:**

Development of an Active, Man-Portable, Cooling System for Use with Personal Protective Clothing/Equipment (PPC/PPE)

**Summary:**

Mainstream has developed an active cooling system that can provide a cool/dry environment to workers in enclosed protective clothing/equipment. The technology is lightweight, comparable to a small backpack in size, and will improve working conditions so that heat stress is no longer a concern for workers wearing fully encapsulating suits.

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## **TOPIC: Smart Facilities and Green Networks**

### **STTR Project**

#### **Company:**

Rnet Technologies, Inc.  
240 West Elmwood Drive  
Suite 2010  
Dayton, OH 45459-4248

#### **Project Title:**

HPC Application Energy Profiling for Energy Optimization

#### **Summary:**

The operating (energy) costs of current and future supercomputers are approaching the procurement costs of these expensive machines. One approach to reducing the energy consumption of supercomputers is to give application developers transparent insight into the application's power requirements. This will allow application developers to make the necessary power/performance tradeoffs.

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## **TOPIC: Solid Oxide Fuel Cell**

#### **Company:**

Mo-sci Corporation  
4040 Hy Point North  
Rolla, MO 65401-8277

#### **Project Title:**

High-Temperature Viscous Sealing Glasses for Solid Oxide Fuel Cells

#### **Summary:**

The proposed collaboration between a small-business specialty materials manufacturing company, university researchers, and the Department of Energy will produce new hermetic sealing materials critical for the development of solid oxide fuel cells as practical alternative energy devices.

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## **TOPIC: Technologies for Clean Fuels and Hydrogen from Coal**

#### **Company:**

Tda Research, Inc.  
12345 W. 52nd Ave.  
Wheat Ridge, CO 80033-1916

**Project Title:**

Poison-Resistant Water-Gas-Shift Catalyst for Biomass and Coal Gasification

**Summary:**

This project will develop a new catalyst that permits efficient fuels production from coal and biomass while minimizing the number of steps. This catalyst performs significantly better than industry-standard commercial catalysts and gives greater yields of synthetic fuels and other valuable products with less energy and lower amounts of feedstock.

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**TOPIC: Technologies for Subsurface Characterization and Monitoring****STTR Project****Company:**

Vista Clara Inc.  
2615 W Casino Road, Suite 4-JK  
Everett, WA 98204-2124

**Project Title:**

Integrated Use of Surface and Subsurface NMR for Measuring and Mapping Saturated Hydraulic Conductivity in Three Dimensions

**Summary:**

This project will develop and demonstrate a cost-effective, minimally invasive field method for using NMR geophysics to measure and map hydraulic conductivity in the top 100m of the subsurface. The proposed methodology will provide reliable, higher-resolution information on this key subsurface property for improved understanding and remediation of contaminated groundwater at DoE legacy sites.

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**STTR Project****Company:**

Glomics, Inc.  
716 Waterwood Dr.  
Norman, OK 73072-4369

**Project Title:**

Development of Microarrays-based Metagenomics Technology for Monitoring Sulfate-Reducing Bacteria in Subsurface Environments

**Summary:**

This project will greatly assist the commercialization of GeoChip technologies, which was awarded as one of the 100 most technological innovations with great commercial potential in 2009. GeoChip/SRMoChip is a metagenomic technology for simultaneously monitoring thousands of microorganisms important to energy, environmental management, agriculture, industry, foods, and human health.

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**TOPIC: Technologies Related to Energy Storage for Hybrid Plug-in Electric Vehicles**

**Company:**

Leyden Energy, Inc.  
46840 Lakeview Blvd.  
Fremont, CA 94538

**Project Title:**

New Electrolytes for Lithium-ion Cells

**Summary:**

Under this program we will develop new non-flammable electrolyte that will significantly improve the performance and safety of li-ion batteries. These new batteries will be well-suited for many applications, including automotive: hybrid, plug-in and electric vehicles

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**TOPIC: Technology to Support BES USER Facilities**

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472

**Project Title:**

New High Resolution, Large Area Detector for Synchrotron Applications

**Summary:**

This project will develop a high performance, large area, position sensitive X-ray detector that will have a positive impact on basic science, non-destructive testing and medical studies.

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**Company:**

Sydor Instruments, LLC  
31 Jet View Drive  
Rochester, NY 14624-4903

**Project Title:**

HERMES-Based X-Ray Strip Detector

**Summary:**

The effectiveness of synchrotron radiation science is being hindered by the limited availability of advanced detectors. This project will result in commercializing a microstrip detector that fills this

gap in detector needs and greatly improves the quantity of quality science coming out of national synchrotron facilities.

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**Company:**

Voxtel, Inc.  
15985 NW Schendel Avenue  
Suite 200  
Beaverton, OR 97006

**Project Title:**

Solution-Processed, Large Area, Pixelated Direct-Detection Radiation Detectors

**Summary:**

Digital X-ray detection has been slow to replace film technology, due to the deficiencies of present materials in terms of performance and large-area manufacturability. Higher-performance nanocrystalbased detectors are under development that are more scalable than traditional semiconductor wafers.

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**TOPIC: Transitional Technology for Solid State Lighting**

**Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Avenue  
Lancaster, PA 17601-5606

**Project Title:**

Dielectric Printed Circuit Board Planar Thermosyphon

**Summary:**

Thermal management has been identified as a critical obstacle along DOE's multi-year road map to ensure and accelerate the development and deployment of LED lighting products. The proposed passive heat spreader will dramatically improve the thermal management of high brightness, light emitting diodes without imposing significant costs. .

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**STTR Project**

**Company:**

Sinmat Inc.  
2153 SE Hawthorne Road  
Suite 124, Box 2  
Gainesville, FL 32641-7553

**Project Title:**

Low Cost, Scalable Manufacturing of Microlens Engineered Substrates (MLES) for Enhanced Light Extraction in OLED Devices

**Summary:**

Lighting consumes >20% of the total electricity generated in the US and nearly 30% of electricity used in commercial and residential buildings. Sinmat's technology will lead to three fold increase in the efficiency of organic light emitting diodes, resulting in substantial energy saving and environmental benefits to the nation. .

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**Company:**

Universal Display Corporation  
375 Phillips Blvd  
Ewing, NJ 08618

**Project Title:**

Thermal Management of Phosphorescent Organic Light Emitting Devices

**Summary:**

This project will increase the conversion efficiency of electrical energy into light of organic-light-emitting devices and thereby enable replacement of inefficient incandescent bulbs, which consume over 8% of the electricity produced in the United States. Our portfolio of technical expertise will enable the development of high-efficiency, environment-friendly, solid-state, white-lighting sources.

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**TOPIC: Wind Energy Technology Development****Company:**

Fulcrum Composites Inc.  
1407 East Grove Street  
Midland, MI 48640

**Project Title:**

Development of high strength, high fatigue wind blade spars

**Summary:**

This project will develop and demonstrate a new method to produce wind turbine blade spars. This will improve long term performance and reliability of wind blades and reduce their manufacturing cost. Together these things will contribute to the safe, rapid expansion of the wind energy industry in the US.

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**Company:**

Physical Optics Corporation  
20600 Gramercy Place, Bldg. 100  
Torrance, CA 90501

**Project Title:**

## Millimeter Wave Inspection Tool for Wind Turbine Components

### **Summary:**

An improved method to inspect wind turbine parts for defects during and after manufacturing is being sought. This research addresses the need by developing a novel inspection tool that rapidly scans the turbine blades, accurately provides their images, and reliably finds defects that lie beneath the surface surpassing the capabilities of existing methods.

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### **Company:**

Michigan Aerospace Corporation  
1777 Highland Drive, Suite B  
Ann Arbor, MI 48108

### **Project Title:**

Weathervane Optimizer

### **Summary:**

A new method of wind turbine monitoring and control is proposed to make wind energy more affordable. By combining novel condition monitoring with unique laser-based, forward-looking wind measurements and advanced control systems, a significant improvement in turbine lifetime and performance is expected. By minimizing down-time and costly repairs, the Cost of Energy can be lowered, which ultimately translates to greater affordability of wind energy to consumers.

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