FY 2011 Phase I Awards Sorted by Topic

TOPICS:

- Nuclear Physics Accelerator Technology
- Nuclear Physics Instrumentation, Detection Systems and Techniques
- Nuclear Physics Isotope Science and Technology
- Deactivation and Decommissioning
- In Situ Remediation
- Remote Sensing
- Radiation Detection
- Global Nuclear Safeguards Research and Development
- Radionuclide Monitoring for Nuclear Explosions
- Advanced Separations Chemistry Tools
- Advanced Technologies for Nuclear Energy
- Advanced Concepts and Technology for High Intensity Accelerators
- High-Speed Electronic Instrumentation for Data Acquisition and Processing
- High Energy Physics Computer Technology
- High Energy Physics Detectors
- High-Field Superconductor and Superconducting Magnet Technologies for High Energy Particle Colliders
- Accelerator Technology for the International Linear Collider
- Advanced Concepts and Technology for High Energy Accelerators
- Radio Frequency Accelerator Technology for High Energy Accelerator and Colliders
- Advanced Technologies and Materials for Fusion Energy Systems
- Fusion Science and Technology
- High Energy Density Plasmas and Inertial Fusion Energy
- Flywheel Energy Storage

TOPIC: Advanced Cooling And Waste Heat Recovery Technologies

Company
Johnson Research & Development Co., Inc.
263 Decatur Street
Atlanta, GA 30312-1705

Title
Advanced cooling using an Electrochemical Heat Pipe (EHP)

Summary
The Electrochemical Heat Pump (EHP), is an extremely novel device with performance meeting or potentially better than existing air conditioning and refrigeration equipment with net-zero direct GHG emissions. EHP operation is based upon the well known operating principles of proton conductive membranes, heat pipes, and binary gas cycles.

Company

Qm Power, Inc.
4747 Troost Avenue, Suite 11
Kansas City, MO 64110-1727

Title
High Efficiency Commercial Refrigeration Motors

Summary
This project will design; build and test advanced high efficiency low cost motors for use in commercial refrigeration and advanced cooling applications. These motors will substantially reduce the payback period associated with alternative high efficiency offerings and provide both upfront cost savings and ongoing energy savings.

STTR Project
Company
Architectural Applications LLC
4109 NE Davis Street
Portland, OR 97232-3444

Title
Building-Integrated Enthalpy Exchange-Thermal and Optical Characterization

Summary
A device integrated into the wall system of buildings serves simultaneously to reduce the energy required for cooling ventilation air and the solar radiation striking the exterior surfaces. The system provides multiple environmental, economic, and health benefits

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

Title
Nanoionic Thermoelectric Regeneration

Summary
America’s power producers, buildings, and industries release and fail to reuse most fossil primary energy; the wasted energy exceeds the amount consumed by the entire Japanese economy. To recover this lost energy, this project will develop a new thermoelectric technology based on nanoporous materials developed for fuel cells.

STTR Project
Company

Voxtel, Inc.
15985 NW Schendel Avenue
Suite 200
Beaverton, OH 3607-3102

Title
Low-Cost Nanostructured Thermoelectric Materials for Efficient Power Generation at Low Temperature

Summary
New nanomaterials will be demonstrated that are capable of efficiently scavenging waste heat from the environment and converting it to electrical energy. The technology will also be useful for energy scavenging in residential and small-scale industrial applications.

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

Title
Aerogel Impregnated Polyurethane Piping and Duct Insulation

Summary
This project will develop cost-effective building materials that will increase energy usage efficiencies. The proposed insulation will reduce energy wastes, thus reducing the carbon footprint of traditional building structures.

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TOPIC: Production of Bioenergy and Biofuels From Cellulosic and Non-Food Biomass

Company
Lygos, Inc.
1534 Innes Ave
San Francisco, CA 94124-2621

Title
High-Throughput Screens and Selections for Microbially Produced Diacids

Summary
This project will develop high-throughput screening technologies to accelerate the R&D process for production of industrial chemicals from renewable feedstocks. Specific focus will be on improving processes for production of plastics from non-petroleum feedstocks.

Company

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

Title
Biomass to Olefins by Catalytic Fast Pyrolysis

Summary
Conversion of lignocellulosic feedstocks from resources as varied as corn stover, grasses, wood, and sugar cane bagasse is crucial to the long-term supply of liquid hydrocarbon transportation fuels in the U.S. This project will develop a catalytic fast pyrolysis method that aims to convert abundant cellulosic and lignocellulosic feedstock materials into reactive olefin monomers – a process we term biomass-to-olefins (BTO).

Company
Altex Technologies Corporation
244 Sobrante Way
Sunnyvale, CA 94086-4087

Title
Infrastructure Compatible Biofuel Production System for Lignocellulosic Biomass (ICBPSLB)

Summary
Second generation biofuels production from non-food lignocellulosic biomass is constrained by the high cost of conventional conversion systems. The development of the proposed robust and low cost lignocellulosic biomass conversion system will reduce biofuels costs, rendering them more competitive with fuels derived from imported oil.

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TOPIC: Hydrogen and Fuel Cells

Company
Applied Nanotech, Inc.
3006 Longhorn Blvd.
Austin, TX 78758-

Title
Ultra Lightweight High Pressure Hydrogen Fuel Tanks Reinforced With Carbon Nanotubes

Summary
One effective way to lower the weight, thus decreasing the carbon fiber usage and lowering the cost, of a CFRP tank is to improve the mechanical properties of the CFRP composite resin matrix using nano-reinforcement. This project will reduce the cost of the carbon fiber by 30-40% by reducing the weight of the CFRP composite by 30-40% reinforced with CNTs used in the

structure of the high pressure hydrogen fuel tank, while maintaining or improving the performance of the tank at the regular weight while the fuel efficiency is significantly improved.

Company
Quantum Fuel Systems Technologies Worldwide, Inc.
17872 Cartwright Road
Irvine, CA 92614-6217

Title
Alternative Fiber Evaluation and Optimization of Filament Winding Processing

Summary
In an effort to improve emissions, reduce the carbon footprint and decrease the dependency on oil, this project will investigate alternative methods to lower the cost of hydrogen storage vessels.

Company
Tetramer Technologies, LLC
657 South Mechanic Street
Pendleton, SC 29670-1808

Title
New High Performance Water Vapor Membranes To Improve Fuel Cell Balance of Plant Efficiency and Lower Costs

Summary
This project will reduce the U.S. dependence on foreign oil and reduce hydrocarbon emissions, by lowering the cost of fuel cell technology for both stationary and transportation applications.

Company
InnovaTek, Inc.
3100 George Washington Way, Suite 108
Richland, WA 99354-1663

Title
Fuel Cell Range Extender for Battery-Powered Airport Ground Support Equipment

Summary
InnovaTek will develop a fuel cell power system that operates on bio-Jet fuel to facilitate the replacement of fossil fuels with renewable fuels for airport ground service equipment thereby improving environmental conditions at airports and their locals as well as improving energy security and sustainability for airport operations.

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TOPIC: Energy Saving Technologies for Commodity Manufacturing Industries

Company
Ald Nanosolutions, Inc.
580 Burbank St. Unit 100
Broomfield, CO 80020-1574

Title
Extended Lifetime Supported Nanocatalysts for Energy Improvements in Commodity Chemical Manufacturing

Summary
This project will study the stabilization of supported metal catalysts using a nanotechnology-enabling coating solution. Expected outcomes are faster reaction rates, improved catalyst lifetimes, reduced energy consumption for commodity manufacturing and pilot-scale test data to validate hypotheses and reduce barriers to commercialization.

Company
Touchstone Research Laboratory, Ltd.
The Millennium Centre
1142 Middle Creek Road
Triadelphia, WV 26059-

Title
Energy Savings Processing of Highly Competitive Novel Composite Matrix

Summary
This project will develop an advanced composite material and process method that will reduce the energy consumption and manufacturing costs of commodity structural materials. This technology will enhance U.S. industrial competitiveness and will lead to ongoing energy savings in the transportation industry where it can replace traditional steel and aluminum materials.

Company
Blue Planet Strategies, LLC
801 Woodlawn Drive
Madison, WI 53716-3668

Title
Lowering Energy use for Copper Production

Summary
This project will develop breakthrough technology to improve U.S. competitiveness by doubling copper mine productivity at low copper production costs while slashing energy needs in half.

The process provides a long sought solution to a capabilities shortfall currently preventing economical copper production from a plentiful low-grade ore source common to US mines.

Company
Aspen Systems, Inc.
184 Cedar Hill Street
Marlborough, MA 01752-3017

Title
Ultra-High Strength Nanostructured Magnesium Alloy-Composite

Summary
Current efforts of DOE to create future lightweight systems in order to attain significant energy saving, cost reduction and improved efficiency requires development of advanced nanostructured lightweight composite materials with improved ductility and high tensile strength. This project will develop a new class of light weight nanostructured magnesium alloy-ceramic reinforced composite in bulk form that exhibits high strength and superior corrosion resistance suitable for future lightweight structural components in military and various aerospace, automotive and thermal management markets that would result in reduced fuel.

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TOPIC: Innovative Solar Power: Lowering The Cost of Novel Photovoltaics, Solar Designs for Desalination, and Distributed Concentrating Solar Power

Company
Nano Enertex, Inc.
4131 Grennoch Lane
Houston, TX 77025-2303

Title
Ultra-Thin III-V Films for Tandem Photovoltaic Application

Summary
The development of defect tolerance in today's high efficiency photovoltaics coupled with a cost effective reel to reel continuous production technique will yield the Holy Grail of the solar energy market – low cost, highly efficient solar cells. These will have a transformational impact on the energy sector of the economy.

Company
Plant Pv
2101 California Street, Unit 106
Mountain View, CA 94040-1671

Title

Highly Efficient Thin Film Tandem Solar Cells

Summary
This project will develop highly efficient thin film multijunction solar cells with the potential to reach grid parity within the next five years. This will spur significant job growth and provide the nation with clean and secure energy.

STTR Project
Company
Xunlight 26 Solar, LLC
3145 Nebraska Ave.
Toledo, OH 3607-3102

Title
Transparent Back Contacts for Thin CdTe-Based Tandem Cells

Summary
This project will optimize carbon nanotube materials to fabricate a tandem solar cell with much higher efficiency than either of the component CdTe or CIGS cells. A successful outcome will help maintain U.S. leadership in photovoltaics technology and lower the cost of clean, renewable electricity generation.

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

Title
Holographic Building Integrated Photovoltaics

Summary
Innovative low-cost integrated photovoltaic solutions are sought to replace current building materials and structures with products that add photovoltaic electricity generation. This project will develop a new holographic building integrated photovoltaic with highly efficient luminit multiplexed holograms with expanded bandwidth, and thin film PV cells.

Company
Creative Light Source, Inc.
4845 Pearl East Circle, Suite 101
Boulder, CO 80301-6113

Title
Holographic Passively-Tracking Planar Solar Concentrator

Summary
A revolutionary approach to Concentrating Solar that projects to reduce the installed $/Watt by 10-25x, via an inexpensive, flat technology that requires no moving parts. Ideal for distributed applications, it may be used in cloudy regions across the U.S., and installations from residential, to industrial, to utility-scale applications.

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TOPIC: Advanced Water Power Technology Development

Company
Qm Power, Inc.
4747 Troost Avenue, Suite 11
Kansas City, MO 64110-1727

Title
Advanced High Power Density Generators for Hydropower Systems

Summary
This project will design, build and test advanced high power density generators for use in hydropower systems. These generators will substantially reduce the weight and cost while increasing the power output and/or efficiency of these systems, resulting in substantial new power generation from renewable sources.

Company
Oscilla Power, Inc.
419 Wakara Way, Suite 207C
Salt Lake City, UT 84108-3506

Title
Reliability Enhancement and Ocean Demonstration of a Low Cost Wave Energy Harvester

Summary
This project will conduct engineering, modeling and prototype testing activities to ensure the reliability of breakthrough no-moving-parts technology which uses novel, domestically available magnetic materials to produce low cost, utility-scale electricity from ocean waves. This technology has strong potential to fundamentally alter the renewable energy landscape.

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TOPIC: Wind Energy Technology Development

Company
Conispire, LLC
15 Yankee Folly Rd

New Paltz, NY 12561-3627

Title
Spiral Welded Wind Turbine Towers

Summary
This project will adapt proven spiral welding technology to produce wind turbine monopole towers on-site at wind farm locations, thereby eliminating transportation limits and enabling more cost-effective and optimally-designed towers.

Company
Bodark Engineering LLC
13 Stroudwater Falls Ln
Gorham, ME 04038

Title
Microgrid Wind Turbine for Distributed Generation

Summary
This project will develop key technical components of an innovative small wind turbine which will deliver reduced cost of energy, increased reliability, and unparalleled safety for families and small businesses.

Company
Magcanica, Inc.
4204 Jutland Drive
San Diego, CA 92117-3665

Title
A Novel PHM and CBM System for Wind Turbine Drivetrains Based on Magnetoelastic Torque and Rate-of-Change-of-Torque Sensing

Summary
Poor wind turbine reliability has impeded the growth of wind energy from becoming a principle source of energy in the U.S. A novel technology, the combined torque and rate-of-change-of-torque sensor offers great potential to function as a highly sensitivity condition monitor to detect wind turbine problems before catastrophic damage occurs.

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TOPIC: Advanced Technology Applications for Buildings

Company
Mechanical Solutions, Inc.
11 Apollo Drive

Whippany, NJ 07981-1423

Title
A Motor-Driven Refrigerant Vapor Compressor to Boost the Pressure of Vapor Entering Existing Heat Pump Compressor to Extend Heat Pump Effective Range to Sub-Zero Temperatures

Summary
This project will enable existing and new design heat pump-based heating systems to efficiently operate at sub-zero temperatures. This will save energy and extend heat pump use to regions cold climates and those without gas or oil

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Company
V-glass, LLC
W265 N3011 Peterson Drive
Pewaukee, WI 53072-4431

Title
Durable Low-Emissivity Coating for Vacuum Glass and Glazing Surfaces Exposed to the Environment

Summary
This project will make and test a new Low-E coating method critical to successful commercialization of highly insulating vacuum glazing. A success would have a large and real impact, not only in reduced total U.S. energy use and emissions, but also in avoided water pollution from natural gas drilling.

Company
Soraa, Inc.
6500 Kaiser Drive
Fremont, CA 94555-3613

Title
Large-Area Semipolar Ammonothermal GaN Substrates for High-Power LEDs

Summary
This project will develop a cost-effective manufacturing technology for large area single crystal wafers of gallium nitride, the material on which white LEDs are based, with a unique orientation. If successful, the new technology will enable fabrication of low-cost, high-efficiency LEDs with the potential to save up to 12% of total lighting energy usage in the U.S.

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TOPIC: Energy Efficient Membranes for Industrial Applications

Company
Aspen Products Group, Inc.
184 Cedar Hill St.
Marlborough, MA 01752-3017

Title
Thermally Stable Hybrid Membranes for CO2 Separation

Summary
The capability to efficiently remove carbon dioxide from gas streams is desirable for a wide variety of applications, including carbon sequestration. This project will develop a high temperature carbon dioxide permeable membrane to separate carbon dioxide from hydrogen, water, nitrogen, oxygen, and other gases.

Company
Bettergy Corp.
46 Bari Manor
Croton-on-Hudson, NY 10520-2337

Title
A Novel Composite Membrane for High Temperature Hydrogen Separation

Summary
Successful completion of this program will make significant contribution toward gaining our nation's energy independence through developing key technologies for the new hydrogen economy. It will also create a new vibrant industry and generate a tremendous amount of new, highly skilled job opportunities for the United States.

Company
Membrane Technology And Research, Inc.
1360 Willow Road, #103
Menlo Park, CA 94025-1524

Title
Novel Thermally Rearranged Polymers for Olefin-Paraffin Separations

Summary
Olefins are the most important building blocks of the petrochemical industry, with a combined annual U.S. production value of over $27 billion. The olefins are usually separated from paraffins using distillation, an energy and capital intensive process. This proposal describes the development of a low-cost and energy-efficient membrane separation process to substantially cut the energy consumption and reduce the cost of olefin production.

Company
Media And Process Technology Inc.
1155 William Pitt Way
Pittsburgh, PA 15238-1368

Title
An Industrial Membrane System Suitable for Distributed Used Oil Re-Refining

Summary
We project about 65 million barrels per year of savings potential can be achieved, resulting in about 1 to 1.5% reduction in crude imports as a result of the successful implementation of the proposed industrial membrane system.

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

Title
Ionic Liquid Membrane Contactor for CO2 Capture

Summary
This project will focus on carbon dioxide removal from power plant flue gas streams. The proprietary technology will permit a low-cost and highly efficient method for capturing carbon dioxide emissions.

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TOPIC: Technologies Related to Energy Storage for Electric Drive Vehicles

Company
Onto Technology LLC
63221 Service RD
STE F
Bend, OR 97701

Title
Advanced Battery Recycling

Summary
This project develops environmentally friendly processes for recycling batteries from portable electronics or electric vehicles. The technology developed will reduce manufacturing costs and be foundational for jobs supporting the nation’s sustainability and energy independence.

Company

Farasis Energy, Inc.
23575 Cabot Blvd.
Ste. 206
Hayward, CA 94545-

Title
Low Cost Venting Solution for Li-Ion Pouch Cells

Summary
A novel approach to venting Li-ion pouch cells will be developed. The technology will greatly increase the safety of large battery systems being developed for electric vehicles and for cells used in many consumer electronics applications.

Company
Angstron Materials Inc.
1240 McCook Avenue
Dayton, OH 45404-1059

Title
Nano Particle-Decorated Graphene-Enabled High-Efficiency Bifunctional Catalysts for Lithium-Air Batteries

Summary
The proposed technology solves long-standing barriers that have prevented the more widespread implementation of Li-air batteries for EV and HEV applications. This technology will further enhance the acceptance of Li batteries by dramatically improving cycle life, cycle and energy efficiency, electrode functionality, and power output.

Company
Inventek Corporation
320 Willow Street
New Lenox, IL 60451-1047

Title
High Energy Density Li-ion Battery with Enhanced Safety, Durability, and Sustainability

Summary
Rolled-Ribbon represents a game changing innovative design and manufacturing method for Li-ion battery as required for electric vehicles. Rolled- Ribbon (a large capacity, stacked-cell battery) can approach the long term USABC goals for EV battery. Legislation, such as Electric Vehicle Deployment Act of 2010 is to provide U.S. consumers with an alternative to auto transportation that relies on foreign oil and has negative environment impact. Growth of the "green" economy is in many ways dependent on the availability of cost-effective, high performance battery energy storage.

Company
Miltec Uv International, LLC
146 Log Canoe Circle
Stevensville, MD 21666-2128

Title
Proposal for UV and EB Curable Binder Technology for Lithium Ion Batteries and Ultracapacitors

Summary
This project will develop a unique high speed, environmentally benign, process for producing Lithium ion battery and Ultracapacitor electrodes. The technology will reduce the time required to cure electrode coatings from tens of minutes to less than a second accompanied by significantly reduced capital cost, operating cost, energy requirements, and environmental concerns.

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TOPIC: Instrumentation for Advanced Chemical Imaging

Company
Anasys Instruments Corp
121 Gray Avenue Suite 100
Santa Barbara, CA 93101-1809

Title
High Speed Wideband Infrared Nanospectroscopy Platform

Summary
This project will give researchers a robust capability to leverage the power of infrared spectroscopy over broad wavelength ranges and at resolution scales well below current limits. The WINS platform will enable a wide range of high resolution characterization in materials science and life sciences including correlation of morphological, chemical, mechanical and optical properties. Based on specific early customer measurement requests, we anticipate significant downstream benefits in areas including the development of advanced polymer materials, automotive materials, photovoltaics, materials for biofuels, textiles, printing and many other areas.

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TOPIC: Technology to Support BES User Facilities

Company
Radiation Monitoring Devices, Inc.
44 Hunt Street

Watertown, MA 02472-

Title
Engineering High Resolution Scintillator for Next-Generation High Frame Rate Detectors

Summary
The development of the scintillator material proposed here will allow the exploitation of the full potential of current state-of-the-art X-ray detectors used for synchrotron applications, medical imaging, X-ray scanning equipment for border control, detectors for homeland security, and small animal research, which is essential to the development of new drugs in a rapid and cost-effective manner.

Company
Advanced Energy Systems, Inc.
27 Industrial Blvd.
Unit E
Medford, NY 11763-2286

Title
Non-Destructive Technique for Measurement of Electron Bunch Longitudinal Charge Distribution

Summary
We propose to develop a novel technique for measurement and monitoring of longitudinal charge distribution. The proposed technique could increase efficiency and reduce operational costs of existing and future accelerators.

Company
Ultramet
12173 Montague Street
Pacoima, CA 91331-2210

Title
Carbon Foam Core Mercury Spallation Target Windows with Protective Gas Film Support

Summary
This project will advance current mercury spallation target technology toward a more robust and implementable form will help enable full-power use of the Spallation Neutron Source at Oak Ridge National Laboratory. The research made possible by the fully functioning SNS will spur considerable advancements in materials science, medicine, and industry.

Company
Kapteyn-murnane Laboratories, Inc.

1855 South 57th Court
Boulder, CO 80301-2809

Title
Multi-keV, High Harmonic Source at 1MHz, Based on Optical Parametric Chirped Pulse Amplification (OPCPA) at 3.1um

Summary
This project will investigate high brightness, table-top X-Ray laser construction using more cost effective laser technology than what is currently available. The project will also be accessing keV photon energies, which will be unprecedented at these pulse repetition frequencies, and enable more ubiquitous X-Ray studies on table-tops, and well as enabling more powerful X-Ray Free Electron Lasers.

Company
Mesa Photonics, LLC
1550 Pacheco St
Santa Fe, NM 87505-3914

Title
Complete Characterization of Ultrafast X-Ray Pulses

Summary
This project will develop low-cost, high precision instruments to improve the performance of high-brightness x-ray sources. These sources can improve medical diagnostics and improve detection for Homeland Security.

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

Title
High Efficiency High Resolution Sensor for Hard X-Ray Microtomography

Summary
The development of the scintillator material proposed here will allow the exploitation of the full potential of current state-of-the-art X-ray detectors used for synchrotron applications, medical imaging, X-ray scanning equipment at airports and border control, detectors for homeland security, and small animal research, which is essential to the development of new drugs in a rapid and cost-effective manner.

Company

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

Title
Design and Modeling of Tabletop X-Ray Sources

Summary
Laser-plasma electron accelerators are an attractive basis for next-generation user facilities to produce intense x-rays that are critical for scientific research, at a small fraction of the size and cost of current facilities. Well-tested software is being enhanced to enable accurate, quantitative simulation and design of such facilities.
Topic

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

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STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Adjustable High Power Coax RF Coupler without Moving Parts

Summary
A high power coaxial RF coupler with variable coupling, without moving parts, is an extremely important innovation that reduces the mechanical complexity of couplers and significantly increases their reliability.

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

Title
2μm-5μm Mid-IR Laser System

Summary
This project will develop a novel laser system capable of producing intense ultrashort infrared laser pulses. Such a laser system is of great benefit to accelerator community and can be employed in many facilities e.g., Stanford Linear Accelerator Collider (SLAC). The SLAC, and facilities like it, provide a new window into the future of the accelerator physics that is critical to our nation’s competitiveness.

Company
Scientific Solutions
11619 Chippenham Way
San Diego, CA 92128-

Title
On-Axis RF Coupler and HOM Damper for Superconducting Accelerator Cavities

Summary
The goal of this project is to develop an improved radio-frequency power coupler for superconducting particle accelerator cavities. Improved power couplers enables higher beam current and power and could significantly improve the performance of superconducting accelerator systems.

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

Title
Passivation Coatings for RF Power Devices

Summary
A core technology is proposed for improved corrosion resistance in water cooled radio frequency devices. An innovative approach to deposit highly uniform ceramic coatings will significantly extend operation lifetime, thus decreasing maintenance costs and downtime of accelerator facilities.

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

Title
High-Power High-Efficiency Amplifiers for Synchrotron Light Sources

Summary
Accelerators used by DoE for nuclear-physics research require huge amounts of electrical power. The proposed grant will develop high-efficiency power amplifiers that will significantly reduce electricity consumption, thus reducing operating costs, importation of foreign petroleum, pollution, and greenhouse-gas emissions.

Company
Surmet Corp.
31 B Street
Burlington, MA 01803-

Title
Durable ALON Windows for High Power Accelerator Applications

Summary
ALON Optical Ceramic, will be evaluated for use in high power RF accelerator applications. Transparent ALON windows transmit the high power RF energy used in high energy accelerators, while allowing the inside of the RF cavities to be inspected visually, providing a unique combination of capabilities.

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

Title
Chirped Electron Bunch Energy Compensation for an X-Ray Light Source

Summary
We have invented a device that equalizes the energy difference between the front and back of an electron bunch. This can significantly improve the performance of future Xray free electron lasers.

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TOPIC: Advanced Sources for Accelerator Facilities

STTR Project
Company
Calabazas Creek Research, Inc.
690 Port Drive
San Mateo, OH 3607-3102

Title
Robust, Long Life Photocathodes

Summary
High efficiency, long life photocathodes will enable development of deployable, high power, RF sources for medical, scientific, industrial, and defense applications.

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Photoinjector Efficiency Enhancement using Surface Acoustic Waves

Summary
High performance electron guns to produce high-current and low-emittance electron beams for the next generation of light sources are being developed using surface acoustical waves to enhance efficiency and reduce costs.

STTR Project
Company
Radiabeam Technologies, LLC
1717 Stewart Street
Santa Monica, OH 3607-3102

Title
Multiphoton Emission Enhancements for High Repetition Rate Photoinjectors

Summary
The multi-photon absorption photoemission is a scheme that has the promise to be an enabling technology to develop a high beam quality and high average power megawatt-class free electron laser.

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

Title
Software for Modeling and Design of Robust GaAs Photocathodes

Summary
Novel high-current, high-brightness, low emittance electron sources are required Free Electron Laser applications and major upgrades of DOE X-Ray light source and particle accelerator facilities. High-Fidelity software is being developed to enable new capabilities to design robust photocathode with the needed operational properties.

Company

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

Title
Nb3Sn Wound Superconducting Undulators for Synchrotron Light Sources
The research is directed towards the development of improved superconducting undulators, the devices that convert the energy of a dedicated synchrotron's electron beam into short wavelength light or x-rays. The research will lead to the emergence of improved light (or "photon") sources for use in materials research, industry, and medicine. For example, this includes the processing of semiconductor chips for computers, determining the age of materials through radiocarbon dating, sterilizing medical equipment and food products and the diagnosing and treatment of cancer.

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

Title
Praseodymium Iron-Boron Undulator with Textured Dysprosium Poles for Compact X-ray FEL Applications

Summary
Synchrotron radiation light source facilities provide critical capability to material science, chemistry, structural biology, pharmaceutical research and medicine. This project will develop a novel magnetic device to significantly enhance the performance of existing and future light sources.

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TOPIC: Ancillary Technologies for Accelerator Facilities

Company
Epic Consulting
101 Mountain Ridge Drive
Mount Sinai, NY 11766-1413

Title
EPICS Version 4 Application to Physics Model Servers

Summary
This project will be used to modify the Matlab Middle Layer Toolkit to use the new PVAccess layer and refactor the code to take advantage of servers for multi-channel arrays. This project will demonstrate that the Matlab Middle Layer Toolkit can be refactored to use Version 4.

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

Title
A User-Friendly, Modular Simulation Tool for Laser-Electron Beam Interactions

Summary
This project will develop a stand-alone, self-consistent simulation tool that is modular, able to support various types of problems with speed and accuracy and packaged in an intuitive, user-friendly interface accessible to a wide user base. The code will offer the advanced accelerator and light source communities a flexible, inexpensive software tool to aid in solving real-life problems dealing with laser-electron beam interactions.

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

Title
Development of a Superconducting RF 500 MHz Quarter Wave Resonator for Synchrotron Light Sources

Summary
Light sources such as the NSLS-II at Brookhaven National Laboratory use electron beams to generate high energy light used in a wide variety of scientific research. This project will design for a new type of accelerating cavity to allow brightness upgrades for these machines.

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

Title
Development of a Superconducting RF Multi-Spoke Cavity for Compact Light Sources

Summary
An alternative design of the superconducting cavities for acceleration of electrons will allow US vendors to provide the cavities at a significant cost reduction within a faster timescale. This project develops a simplified version of the multi-spoke cavity to make it useful for linear and circular new and existing accelerators.

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

Title
A Novel Fabrication Technique for SRF Fundamental Power Couplers

Summary
RadiaBeam Technologies is proposing a new manufacturing method that promises to increase the performance of superconducting accelerators, and making them less-expensive, more reliable devices with wider applicability.

Company
Advalue Photonics Inc.
4585 S. Palo Verde Road, Suite 405
Tucson, AZ 85714-1962

Title
High Energy Sub-100 Femtosecond Fiber Lasers at 2 Micron

Summary
The technique of Current-Enhanced Self- Amplified Spontaneous Emission (ESASE) is widely acknowledged to be beneficial in areas ranging from atomic and molecular sciences to chemical, materials, and biological studies. ESASE requires an ultrafast (sub-100 fs) high peak power, high repetition rate, stable pulsed laser systems which operate in the mid-IR range of no less than 2μm. AdValue Photonics proposes a high-energy 2μm femtosecond fiber CPA laser system that could deliver pulses energy as high as 7mJ and duration of sub-100 fs.

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

Title
High Peak Power 355 nm Pulse Shaping Fiber Laser

Summary
A compact ultrafast fiber laser system will be developed for next generation MW peak power 355 nm sources. It will enable high peak power, high PRR, high quality, and low cost high energy study.

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TOPIC: Instrumentation for Electron Micropscopy and Scanning Probe Microscopy

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

Title
Full Pressure Range Environmental Gas Heating Holder for the Transmission Electron Microscope

Summary
This project proposes to develop and commercialize an electron microscope environmental gas specimen holder to give researches radically improved methods for studying energy materials as to better understand energy generation and storage processes at the nanometer scale. This in turn should facilitate miniaturization of current energy devices such as batteries and fuel cells.

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

Title
Novel Ultrafast Electron Diffraction System

Summary
This project will build an electron microscope that can ‘make a movie’ of ultrafast processes that happens on the atomic scale. The device would lead to new discoveries in material science.

STTR Project
Company
Newpath Research LLC
2880 S. Main Street, Suite 214
Salt Lake City, OH 3607-3102

Title
Scanning Tunneling Microscopy with a Frequency Comb

Summary
This project will develop a new method that may vastly increase the amount of data in scanning tunneling microscopy (STM) with possible applications to nanoscale dopant profiling in semiconductors, which NIST and the ITRS classify as an unmet need having significant economic proportions.

Company
Optonet Inc.
828 Davis Street STE 206
Evanston, IL 60201-

Title
Ultra High Power NSOM Probe Based on Low Loss High Refractive Index Contrast Nanoscale Tip Integrated with Laser and Detector

Summary
Near-field scanning optical microscope (NSOM) uses a nano-dimension light energy source for imaging and is widely used in nanotechnology. Current NSOM can only provide nano-Watts optical scanning power. The proposed technology enables NSOM probes that is 100 to 10,000 times brighter, which will enable many nanotechnology applications not currently possible.

Company
Rhk Technology, Inc.
1050 East Maple Road
Troy, MI 48083-2813

Title
An Advanced Environmental SPM System with Beam Deflection AFM Capability Suitable for Catalysis Research at Variable Pressure and Variable Temperature, which has all Available SPM Imaging Modes

Summary
This project will develop a specialized SPM for energy research applications. This new nanotech instrument will advance the nation's development of clean energy, optimized catalysts, and novel batteries and other forms of energy storage.

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TOPIC: Instrumentation for Materials Research Using Ultra-Bright or Ultra-Fast X-Ray Sources

Company
Kapteyn-murnane Laboratories, Inc.
1855 South 57th Court
Boulder, CO 80301-2809

Title
Tunable Narrow-Band High Harmonic Beamline Optimized for Ultrafast Soft X-Ray Photoemission and Imaging

Summary

This project will produce a commercial source of short wavelength light useful for studying the processes occurring in semiconductors, and cells, and other materials on a very short timescale and with resolution better than an optical microscope.

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

Title
Superconducting Tunnel Junction Detectors for High-Resolution X-Ray Spectroscopy

Summary
STAR Cryoelectronics proposes to develop an innovative process for the fabrication of highly efficient, high energy resolution superconducting tunnel junction detectors for X-ray absorption spectroscopy (XAS) at synchrotron facilities. Conventional X-ray detection technologies are unable to meet the demanding requirements for XAS. The advanced detectors to be developed during Phase I and Phase II will be very attractive for XAS applications as well as potential applications in astrophysics research and in genomics and proteomics.

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TOPIC: Instrumentation and Tools for Materials Research Using Neutron Scattering

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STTR Project
Company
Nova Scientific, Inc.
Sturbridge Technology Park
10 Picker Road
Sturbridge, OH 3607-3102

Title
Very Large Area Microchannel Plate Neutron Detectors

Summary
This project will establish a solid-state neutron imaging detector capable of fully replacing existing 3He gas tube detectors which are now a limited national resource. This instrumentation will provide new capabilities to Oak Ridge and others while maintaining U.S. leadership in neutron science.

Company
Xemed, LLC
16 Strafford Avenue
Durham, NH 03824-1908

Title
Polarized 3He Gas Circulating Technologies for Neutron Analyzers

Summary
The proposed technology allows the creation of wide polarized neutron beams. Polarized neutrons are vital to study of thin magnetic multilayer films that form the basis of devices such as MRAM and computer hard-drives read heads, magnetic nano-particles that may lead to high-density data storage devices, high-temperature superconductors and other applications with tremendous commercial and scientific potential.

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

Title
GISMo: A Modeling Software Tool for Predictive and Real-Time Analysis of GISAS Data

Summary
This project will develop an innovative software suite for accelerating materials prediction, discovery, and validation.

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

Title
Genetic Algorithm Driven Molecular Structure Determination and Visualization for Real-Time Decision Support

Summary
The Genetic Algorithm Driven Decision Support System (GADDSS) will enable the real-time molecular structure determination of the leadership Spallation Neutron Source instruments experiment samples. This system provides more efficient use of the DOE facility while enabling the discovery of new/improved materials and science/engineering solutions for our nation's researchers.

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TOPIC: Novel Membrane and Electrolyte Development for Redox Flow Batteries

Company
Lynntech, Inc.
2501 Earl Rudder Freeway South

College Station, TX 77845-6023

Title
Acid-Base Blend Membranes for Redox Flow Batteries

Summary
Development of low-cost and highly selective proton-conducting blend membranes can enable the development of cost-effective and durable power systems for stationary applications. It also helps efficient use of electricity generated from renewable energy sources and reducing emissions.

Company
Tiax LLC
35 Hartwell Avenue
Lexington, MA 02421-3102

Title
Flow Battery Membrane

Summary
This project will develop a novel membrane that will enable widespread use of flow batteries as energy storage systems for renewable energy plants as well for conventional power plants. The benefit to the public is lower greenhouse gas emissions and a more reliable power grid.

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TOPIC: High Performance Materials for Nuclear Application

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

Title
Minimizing Fuel Assembly Distortion in LWRs to Prolong Life and Increase LWR Sustainability

Summary
The new fuel assembly structure developed in this project will enable higher fuel burnup from existing nuclear fuel, and thereby reduce the volume of nuclear waste.

Company
Lambda Instruments, Inc.
840 University City Blvd
Suite 4

Blacksburg, VA 24060-2708

Title
In-Situ Structural Monitoring of Light Water Reactors

Summary
Lambda Instruments proposes to develop a unique health monitoring technology for existing and emerging light water reactors. Such technology will enable a significant advancement in safety, reliability and longevity of these reactors.

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TOPIC: Advanced Coal Research

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

Title
An Electrochemical Pathway to Fuels and Chemicals from CO2

Summary
CO2 is a very plentiful carbon source. However, it is generally difficult to convert to useful products and often consumes energy in doing so. The proposed electrochemical technology will efficiently electrochemically convert carbon dioxide to useful chemicals or polymers.

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

Title
Upgrading of CO2 to Methanol with Integrated Photocatalysis

Summary
A new process to recycle carbon dioxide is being developed. The process combines CO2 and sunlight to make valuable commodity chemicals and fuels. If successful, the process would allow cost-effective, large-scale recycling of CO2 from industrial sources.

Company
Liquid Light, Inc.
7 Deer Park Drive
Suite F
Monmouth Junction, NJ 08852

Title
Electrocatalytic Conversion of Carbon Dioxide to Butanol

Summary
This project will develop technology for converting carbon dioxide to butanol, a gasoline alternative. The research will address the problems of energy security and climate change, while providing the United States new opportunities for job creation in the chemical and energy industries.

Company
Materials & Systems Research, Inc.
5395 West 700 South
Salt Lake City, UT 84104-4403

Title
Solid Oxide Fuel Cell Cathode Enhancement Through a Vacuum-Assisted Infiltration Technique

Summary
If successful, this project will develop a cost-effective SOFC technology for the generation of clean electrical energy from fossil fuels or renewables which is cost-competitive with conventional power generation methods, while reducing dependence on foreign energy imports.

Company
Mesoscribe Technologies, Inc.
7 Flowerfield, Suite 28
Saint James, NY 11780-

Title
Self-Powered Wireless Sensors for Fossil Energy Based Turbine Systems

Summary
This project will develop self-powered wireless sensors for online, real-time monitoring applications of gas-turbine power system in extremely harsh working conditions. The technology will enable steam turbines and other critical components to be monitored and operated efficiently to prevent unforced shutdowns, reduce maintenance costs, and reduce emissions.

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TOPIC: Advanced Fossil Energy Research

Company
Questek Innovations LLC
1820 Ridge Avenue
Evanston, IL 60201-

Title
Computational Design of Weldable High-Cr Ferritic Steel

Summary
Higher operating temperatures at coal-fired power plants can increase efficiency and reduce CO2 emission while also enhancing national security, domestic employment, balance of trade and U.S. GDP. This project will utilize a fundamental computational Materials by Design® approach to design and develop improved, weldable alloys to enable high efficiency power plants.

Company
Makel Engineering, Incorporated
1585 Marauder Street
Chico, CA 95973-9064

Title
Integral Packaging of High Temperature Chemical Sensors for In-Situ Measurements

Summary
While energy sources are becoming more diversified, fossil fuels are still the most prevalent and abundant source of energy, and will continue to account for a significant portion of the energy generated for the foreseeable future. This project will develop an integral package to enable operation of MEMS sensors in the harsh environment associated with advanced power systems. The packaging will support chemical sensors such as the planar thick film high temperature sensors developed for CO and CO2 monitoring by our team and research partners. The integral design enables upgrading systems as newer sensor options become available.

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TOPIC: Climate Control Technologies for Fossil Energy Applications

STTR Project
Company
Green Technology Ltd Co.
3903 Spring Valley Way
Louisville, OH 3607-3102

Title
A Contaminant Tolerant Solvent for Carbon Capture in Existing Coal-Fired Power Plants

Summary
This project is to develop a novel solvent technology to reduce CO2 emissions reduction at existing coal-fired power plants by at least 90% with less than 30% cost increase.
Topic
Climate Control Technologies for Fossil Energy Applications

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

Title
Dense CO2 Membrane

Summary
The proposed technology will provide the advanced coal-fired power plants with cost-effective method of CO2 capture. This enables the use of coal, a domestically available resource, to produce electricity with very high efficiency while substantially reducing the green house gas emissions.

Company
Sustainable Innovations, LLC
160 Oak St.
Unit 410
Glastonbury, CT 06033-2336

Title
Electrochemical Polymer Precursor Generation (EPPG)

Summary
This project is focused on the development of technology that electrochemically transforms waste carbon dioxide into commodity chemicals that are critical to the manufacture of polymers and durable goods. When coupled with renewables, this technology forms the basis of a carbon-negative, efficient, industrially scalable system.

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

Title
A Novel Sorbent to Reduce CO2 Emissions from Existing Coal-Fired Power Plants

Summary
This project will develop a new material to effectively remove CO2 from the effluents of existing coal-fired power plants. This process is a highly efficient and environmentally responsible way to generate electricity without emitting greenhouse gases and to overcome the economic and environmental problems that limit the full utilization of coal.

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TOPIC: Coal Gasification Technologies

Company
Tiax LLC
35 Hartwell Avenue
Lexington, MA 02421-3102

Title
Optimization of CO2 - Coal Slurry

Summary
This project will commercialize technology that will enable the use of low-cost clean coal technology for applications such as power generation, coal-to-fuels production, and industrial chemical production.

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TOPIC: Advanced Turbine Technology for IGCC Power Plants

Company
Barber-nichols Inc.
6325 West 55th Avenue
Arvada, CO 80002-2777

Title
Turbine Component Rapid Manufacturing via Electron Beam Melting/Electrochemical Machining

Summary
This project will develop a combined novel rapid manufacturing process “Electron Beam Melting” EBM, with a rapid material removal process “Electro Chemical Machining” ECM, to provide a low-cost, high-quality alternative to the traditionally expensive and time consuming casting processes for industrial gas turbine engines. This will enable significantly shorter engine development cycle times as well as provide a faster, lower cost approach for the manufacture of complex cast parts across multiple industries.

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TOPIC: Fuel Cell Technologies for Central Power Generation with Coal

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

Title
High Performance Catalytic Heat Exchanger for SOFC Systems

Summary
This project will develop a novel catalytic heat exchanger to reduce the cost and increase the performance of solid oxide fuel cell (SOFC) power plants for the distributed generation market. The effort is based on a 300 kW SOFC plant fueled by renewable biogas, natural gas, or coal-based syngas.

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TOPIC: Oil and Gas Technologies

STTR Project
Company
Frac Biologics, Inc.
225 Rosss Street
Sixth Floor
Pittsburgh, OH 3607-3102

Title
Biofilm Remediation of Hydraulic Fracturing Flowback Water in the Marcellus Shale

Summary
Hydraulic fracturing fluid from Marcellus Shale gas wells typically contains hazardous quantities of heavy metals, selenium, arsenic, and organic pollutants that are disposed in Pennsylvania streams. Researchers at Frac Biologics and Allegheny Singer Research Institute are testing an exciting new biotechnology to cost effectively remove these contaminants from frac water.

Company
Sky Research, Inc.
445 Dead Indian Memorial Road
Ashland, OR 97520-9706

Title
Geophysical Monitoring of In-Situ Oil Shale Retorting

Summary
This project will develop and validate a methodology for non invasive measurement and monitoring of oil shale retorting temperatures.

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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

Title
Quantum Cascade Laser System for Simultaneous Measurements of 13CO and C18O Carbon Monoxide Isotopologues

Summary
Carbon monoxide (CO) is an atmospheric trace gas with an important role in atmospheric chemistry and global change. This project will produce a laser based isotopic carbon monoxide monitor that will be used to quantify the various sources of atmospheric CO based on their distinct isotopic signatures in order to assess their impact on the atmosphere and climate change.

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

Title
Isotopic Carbon Dioxide Analyzer for Flux Measurements

Summary
This project will develop a rugged, field-deployable, Off-Axis Integrated Cavity Output Spectroscopy (Off-Axis ICOS) instrument for atmospheric carbon dioxide isotopic flux measurements. In addition to continuous measurements of CO2 in air, the instrument will be capable of discrete measurements of batch samples via syringe injection.

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

Title
Balloonborne Sensor for Measuring Atmospheric Carbon Dioxide

Summary
A high-performance, low-cost, optical sensor is proposed that provides exceptional sensitivity to atmospheric carbon dioxide. The compact device will be rugged and lightweight for ready implementation into measurements onboard weather balloons.

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

Title
Fully Integrated Low-Cost High-Precision Carbon Dioxide Analyzer

Summary
Inexpensive high-performance carbon dioxide sensors are required in the field to understand global warming. The proposed laser sensor technology will provide the required measurements for an exceptional value.

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

Title
Objective Climate Monitoring Networks

Summary
A dense CO2 sensor network is proposed that is appropriate for the objective monitoring of airborne pollution of American cities and efforts of environmental remediation. The program, including management and technology, can be scaled to monitor cities of all sizes and climate of North America.

Company
Kalscott Engineering Inc.
P.O. Box 3426
Lawrence, KS 66046-5016

Title
Stabilized Platform for Airborne Instrumentation

Summary
This project will develop and demonstrate stabilized platforms for airborne instrumentation to enable highly accurate measurements of atmospheric radiation, which under-pin a strategy of sustainable and pollution-free energy.

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TOPIC: Enhanced Availability of Climate Model Output

Company
Kitware, Inc.
28 Corporate Drive
Clifton Park, NY 12065-8688

Title
ClimatePipes: User-Friendly Data Access, Data Manipulation, Data Analysis and Visualization of Community Climate Models

Summary
The proposed work provides non-researchers simple access to and analysis tools for computer model output resulting from high-resolution, long-term, climate change projections performed as part of the U.S. Global Change Research Program.

Company
Vertum Partners Lp
2400 Beverly Blvd
Los Angeles, CA 90057-1002

Title
Assessing Climate Change Effects on Wind Energy

Summary
This project will develop a software tool that will incorporate effects of long-term changes in climate on wind energy production. This will allow wind farm project analysts and risk assessors the ability to plan for the benefits and risks of a changing climate.

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TOPIC: Atmospheric Measurement Technology

Company
Spec Incorporated
3022 Sterling Circle
Suite 200
Boulder, CO 80301-2377

Title
Tethered Balloon Systems for Arctic Measurements in the Near-Surface Atmosphere

Summary
Arctic stratus clouds trap heat and are a major contributor to the melting of sea ice and global warming. Deployment of a tether balloon system to measure Arctic cloud properties is cost effective and will improve our understanding of climate change in the Arctic.

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

Title
Volatility and Polarity Separated Total Organic Aerosol using Thermal Desorption Modulated Chromatography

Summary
Small airborne particles generated from energy-related activities can adversely impact global climate, human health, and visibility. Atmospheric aerosol particles are known to contain a large fraction of organic components. This project will develop an instrument with unique capabilities for identifying and measuring the organic constituents of aerosol particles, leading to a better understanding of the sources, transformations and fates of atmospheric particulate matter.

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

Title
High Sensitivity HNO3 Monitor using Continuous Wave Quantum Cascade Laser IR Absorption

Summary
Improved measurement techniques for atmospheric gas phase nitric acid are needed to better understand global climate change. This project will design a novel instrument for nitric acid which can be used to elucidate cloud condensation droplet activation and nitrate aerosol processes in the atmosphere.

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

Title
Airborne Sensor for Aerosol Precursors

Summary
An airborne sensor will be developed that can monitor low atmospheric concentrations of the aerosol precursor ammonia. It will help to unravel aerosol formation and their impact on climate.
Topic
Atmospheric Measurement Technology

STTR Project
Company
Aerosol Dynamics, Inc.

935 Grayson Street
Berkeley, OH 3607-3102

Title
An Aerosol Mobility Imager for Rapid Size Distribution Measurement

Summary
An instrument will be developed for rapid measurement of airborne ultrafine and nanometer sized particles, with wide-ranging applications to research and industry.

STTR Project
Company
Droplet Measurement Technologies
2545 Central Avenue
Boulder, OH 3607-3102

Title
Rapid Scan Dynamic Humidity Particle Spectrometer

Summary
The Continuous-Flow Streamwise Thermal-Gradient CCN counter (CFSTGC) has proven to be reliable, robust, and relatively simple to operate for ground-based and airborne measurements. This project will expand the SFCA and subsaturated operational modes of the CCN to improve the particle counting capability with a more sensitive optical particle counter. Software will also be developed to simplify the data analysis.

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

Title
Expanded Wavelength CAPS-Based Particle SSA Monitor

Summary
Ambient atmospheric aerosols generated through human activities can exert an influence on the earth’s radiation budget (and thus the 'greenhouse effect') comparable in magnitude with greenhouse gases such as carbon dioxide and methane. This device will enable scientist to measure critical optical properties of such aerosols in a routine fashion in order to provide better predictions of climate change.

Company
Visidyne, Inc.

99 S. Bedford St, Suite 103
Burlington, MA 01803-5155

Title
Cloud Microphysical Properties from Stellar Aureole Measurements

Summary
The project will improve the monitoring of the impacts of cirrus clouds on climate change by developing the technology to retrieve the microphysical properties of cirrus clouds using ground-based measurements of the radiance of the aureoles surrounding stars produced by the cloud particles.
Topic
Technologies for Subsurface Characterization and Monitoring

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TOPIC: Technologies for Subsurface Characterization and Monitoring

STTR Project
Company
Burge Environmental, Inc.
6100 South Maple Avenue
Suite 114
Tempe, OH 3607-3102

Title
Development of An Automated System to Measure Tritium in Groundwater: A toll to Enable Remote Field Monitoring for the Presence and Migration of Tritium at contaminated DOE and nuclear generating site

Summary
A field-deployable monitoring system providing cost-effective, rapid determination of radioactive substances in the groundwater at federal sites, such as Hanford Site, Washington, will be developed. The development of the system will lead to significant decreases in the future cost of site remediation.

Company
Vista Clara Inc.
12201 Cyrus Way, Suite 104
Mukilteo, WA 98275-5735

Title
Low Cost In-Situ NMR Technologies for Monitoring Biological and Geochemical Processes in the Subsurface

Summary

This project will develop and demonstrate the application of low-cost in-situ NMR instrumentation and measurement techniques for monitoring bioremediation of contaminated groundwater aquifers. The proposed methodology will provide reliable, higherresolution information on this key subsurface process for improved understanding and remediation of contaminated groundwater at DoE legacy and commercial sites.

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TOPIC: Imaging and Radiochemistry

Company
Sofie Biosciences, Inc.
6162 Bristol Parkway
Culver City, CA 90230-6604

Title
Commercialization of a Microscale, Point-of-Use Radiosynthesis Device for the Development and Production of PET Probes

Summary
Positron Emission Tomography (PET) provides images of the biology of living systems, from microorganisms in the environment to disease pathways in patients. An affordable, compact, chip-based device to produce PET probes will enable scientists to image diverse biological systems by eliminating barriers that currently limit probe availability and diversity.

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

Title
Ultra-High Resolution High Sensitivity PET for Plant Imaging

Summary
The proposed project will investigate a novel detector technology that will be very useful in plant and biological imaging. It will also be useful in other scientific studies such as high energy physics and space research as well as commercial applications.
Topic
Genomic Science and Related Biotechnologies

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TOPIC: Genomic Science and Related Biotechnologiestop

STTR Project

Company
Namesforlife, LLC
325 Grand River, Suite 300
East Lansing, OH 3607-3102

Title
The NamesforLife Semantic Index of Phenotypic and Genotypic Data for Systems Biology

Summary
This project will develop a novel technology that resolves uncertainty about the meaning of biological names or other dynamic terminologies. It uses those terms to create persistent links to related information, goods, and services available on the Internet, even if the terms have changed.

Company
Cfd Research Corporation
215 Wynn Drive, NW
5th Floor
Huntsville, AL 35805-1944

Title
Development of Predictive Software Tools to Construct and Analyze Dynamical Networks for GTL Systems Biology Knowledgebase

Summary
Development of efficient alternative energy sources such as biofuel producing microbes can aid in reducing U. S. dependency on imports of fossil fuels. This project will develop technologies that aid this step by predicting if a particular microbe can yield the desired yield and in identifying which critical parts of its internal signaling architecture need to be targeted to make it more efficient in this task.

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TOPIC: Smart Facilities and Green Networks

Company
Decision Detective Corporation
4354 Town Center Blvd. #114-250
El Dorado Hills, CA 95762-7116

Title
Power Management Optimization Platform for High Performance Computing and Data Centers

Summary

This project will create accurate and timely intelligence from monitored High Performance Computing and datacenter climate conditioning equipment that saves significant energy and lowers computing costs, all resulting in a greener environment.

Company
Enhanced Systems Consulting, Inc.
3201 Hanover Road
Johnson City, TN 37604-1463

Title
Dynamically Controlled Electric Demand Management System

Summary
The United States needs greener solutions for managing energy sustainability, including methods for the more efficient distribution of electrical power. ESC, BTES, and East Tennessee State University are developing a novel approach for intelligently minimizing peak demand and maximizing energy efficiencies over the grid to save energy and money.

Company
Nanosonic, Inc.
158 Wheatland Drive
Pembroke, VA 24136-

Title
Self-Powered Wireless Sensing and Control of Intelligent Facilities

Summary
Efficiency of commercial and residential structures will be improved with the wireless High Performance Computing system. As a result, operational cost and subsequent emissions required directly and indirectly for private and federal facilities would be reduced with increased efficiency.

Company
Cognitive Electronics LLC
16 Cavendish Ct., Suite 2F
Lebanon, NH 03766-1441

Title
Power Efficient Supercomputing

Summary
This project will develop a new kind of supercomputer that consumes less energy while running existing software with much higher performance. Putting this power in the hands of scientists is

anticipated to improve the likelihood of curing diseases, better predict certain natural disasters, and reduce datacenter carbon emissions.

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TOPIC: Data Management and Storage

Company
Antek Peripherals Inc.
21451 Continental Circle
Saratoga, CA 95070-6505

Title
Significantly Enhance Hard Disk Drive Performance by using Titanium Foil Disk Substrates

Summary
Data storage and computing is a part of our daily lives and is important for business, communication, entertainment and for Government. This project will allow the popular hard disk drive to store more data, transfer it faster, and use less space all while consuming less energy.

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TOPIC: Modeling and Simulation of Industrially-Relevant Problems

Company
Dynaflow, Inc.
10621-J Iron Bridge Road
Jessup, MD 20794-9381

Title
Multi-Scale Two-Phase Bubbly Flow Modeling

Summary
This project will develop a computational fluid dynamics code which combines methods used at different flow scales to enable simulation of complex bubbly flows. This tool will benefit chemical, oil and gas, nuclear, and marine industries to improve efficiency of industry systems involving bubbly mixture flows.

Company
Simmetrix Inc.
10 Executive Park Drive
Clifton Park, NY 12065-

Title
Reliable Parallel Electromagnetic Simulations on High-Order Unstructured Meshes

Summary
This project will provide simulation automation tools for the application of a new generation simulation technologies which represent the only viable means of reliably providing the high accuracy results needed for design of critical systems. These tools will be applied to electromagnetic design problems ranging from threat detection, to antenna design, to wireless device design, to the treatment of cancer, to billion dollar high-energy scientific accelerators.

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

Title
High Fidelity Simulation of Laser-induced High-Energy Spark Ignition

Summary
Commercial software will be used and further enhanced in order to reduce both risk and cost in development of laser-induced spark ignition systems. These laser-induced spark ignition systems will be an essential part of fuel efficient, reduced emission engines, which will result in billions of dollars in savings for the U.S. economy under a variety of operating and market strategies.

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TOPIC: 100 GigE Networking Components

Company
Intelligent Automation, Inc.
15400 Calhoun Drive, Suite 400
Rockville, MD 20855-2737

Title
CAGE-100: Real-Time Multi-Port Packet Capture System for 100 Gigabit Ethernet Traffic

Summary
An innovative traffic capture tool for 100 Gigabit Ethernet (CAGE-100) is proposed. This technology will help the advancement of 100 Gigabit per second infrastructure, and will assist DOE in the development of its Energy Science Network (ESnet) serving thousands of Department of Energy scientists at over 40 institutions and national laboratories, as well as connecting to more than 100 other networks.

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

Title
Bro-Intelligent Load Balancer Towards Terabit-Scale Cyber-Security

Summary
In an increasingly hostile computing environment, Network Intrusion Detection Systems (NIDS) serve an indispensable role in preserving the integrity of computer networks. The proposed technology will allow for substantial CAPEX and energy savings costs of the NIDS architecture.

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TOPIC: High Performance Computing Systems

Company
Accelogic LLC
1830 Main Street, Suite 204
Weston, FL 33326-

Title
Extreme-Speed Eigensolver Suite

Summary
To pursue DOE's scientific priorities, quantum increases in large-scale computing and simulation/modeling speeds are needed. This project will develop breakthrough, low-cost technology that reduces computational times from months to hours or days to seconds, thus revolutionizing entire industrial design cycles and the way we do science in general.

Company
Paratools, Inc.
2836 Kincaid Street
Eugene, OR 97405-

Title
Tahiti: A Platform for Total Eclipse use in Remote Computing

Summary
ParaTools, Inc. increases productivity of HPC developers, adds workers to support modernized HPC development, and delivers higher quality software production on leadership class machines. Tahiti targets modern multicore technology and promotes efficient development of HPC software products.

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TOPIC: Collaboration, Scientific Visulization and Data Understanding

Company
Power Info LLC

18819 36th Dr SE
Bothell, WA 98012-8843

Title
A Data-Driven Approach to Interactive Visualization of Power Grids

Summary
This project will develop a data-driven visualization tool to enhance situational awareness in a power grid control center environment. The goal is to assist grid operators to perceptually monitor a large number of events and timely present the analytical information that reduces cognitive demands on operators.

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

Title
Visualizing Staggered Vector Fields

Summary
This project will extend the leading DoE funded visualization tool VisIt to support edge and face centered data. Such data arise in fluid, climate, and electromagnetic modeling.

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TOPIC: Nuclear Physics Software and Data Management

Company
Virkaz Technologies LLC
865 Ashfield Drive
Decatur, GA 30030-5314

Title
Data Centric Computing for Nuclear Physics

Summary
The infrastructure developed by Google for its MapReduce algorithm has obviously had an impact upon the world of search. This project will develop libraries and adaptation modules that will allow virtualized Nuclear Physics software to run efficiently under MapReduce.

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TOPIC: Nuclear Physics Electronics Design and Fabrication

Company

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

Title
High Density Low Cost Readout Electronics for Large Scale Radiation Detectors

Summary
Development of affordable yet high performance digital readout electronics is vital to support cutting edge nuclear science research at national nuclear facilities and universities. This proposed work will help the U.S. to maintain its scientific and technological leadership role in the world, to educate and train future nuclear science workforce in U.S. schools or universities, and to improve the nation's homeland security.

Company
Advanced Science And Novel Technology Company
27 Via Porto Grande
Rancho Palos Verdes, CA 90275-

Title
High-Speed ADC SoC with Ultra-Wide Input Dynamic Range

Summary
This project will result in the development of an advanced ADC for accurate digitization of analog signals with wide dynamic ranges that are generated in particle detectors and other sensors. This will help to achieve a new level of knowledge in Nuclear and High-Energy Physics and improve commercial data acquisition systems.

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TOPIC: Nuclear Physics Accelerator Technology

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

Title
Fast 704 MHz Ferroelectric Tuner for Superconducting Cavitie

Summary
The quest for understanding the origin of the universe requires continued search for elementary particles, for which high-energy accelerators are necessary tools. This project is to develop a fast tuner for superconducting accelerator cavities that could reduce by a factor-of-ten the power needed to energize the accelerator.

Company
Sienna Technologies, Inc.
19501 144th Ave NE
Suite F-50
Woodinville, WA 98072-4423

Title
Aluminum Nitride Based Absorber Materials for Toom and Cryogenic Temperatures

Summary
Often the lack of availability of proper materials for the accelerator or microwave vacuum tubes, which are used from medical research to satellite communications, has limited the performance of the systems designed around them. The availability of increasingly better artificial dielectric materials will certainly provide new ideas and solutions to the system builders who will benefit from the existence of improved microwave absorbers.

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

Title
High-Efficiency Power Amplifiers for 80, 161, and 322 MHz

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

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Achromatic Low-Beta Interaction Region Design

Summary
In order to maximize the discovery potential of particle colliders at the energy frontier, the particle beams must be focused to a very small size where they collide. A new approach to the design of the required beam focusing systems is being developed.

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

Title
Compact Crab Cavity Design

Summary
A leading area of research in accelerator luminosity improvement, crab cavity design, will benefit from state-of-the art simulation tools to address difficult size and performance constraints.

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

Title
Integrated Modeling Tool for Electron-Beam Based Ion-Sources

Summary
This project will develop a numerical modeling tool that will guide and optimize electron-beam based ion-sources for research and industrial applications. The tool will minimize trial and error experiments in current experiments, and help design future advanced devices, which is crucial for rare isotope ion sources that are needed in nuclear physics research, and further in medical and industrial applications.

Company
Q-peak, Inc.
135 South Road
Bedford, MA 01730-2307

Title
A 100 W Green Laser for Photoinjection of GaAs Photoemission Guns

Summary
The laser that is being proposed in this project will be one of the key components needed to advance accelerator science and technology. Long term applications are in the fields of medicine, material processing and defense.

Company
Svt Associates, Inc.
7620 Executive Drive
Eden Prairie, MN 55344-

Title
Enhanced Quantum Efficiency of Photocathodes with Polarized Emission

Summary
“Polarized electron emitters” isolate and enhance one of the two naturally occuring forms of the electron subatomic particle. This project will create a new, highly efficient source of polarized electrons for use in high energy particle physics research.

STTR Project
Company
I.C. Gomes Consulting & Investment Inc.
1728 Killdeer Dr
Naperville, OH 3607-3102

Title
Intense Radioactive Beams via a Compact Fission Source/Target

Summary
This project will develop a low cost option for an ISOL facility for Nuclear Physics such as FRIB. The project will build on the MAFF (Germany) design and R&D experience and adapt it to a compact subcritical (or critical) reactor (CAMI – Compact Accelerator-driven Multiplier for Isotopes) designed for medical isotopes production. If fully implemented, this approach will solve two fundamental problems facing the DOE, supply shortage of key isotopes for medicine, and the lack of an intense ISOL facility at the same level of facilities in Europe and Asia.

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
High Radiation Environment Nuclear Fragment Separator Magnet

Summary
High-temperature superconducting wire is being used for the design of a dipole magnet in the fragment separator region of FRIB. This magnet must operate in the high radiation and high heat load environment from the production target.

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

Title
Characterization of the Fast Ion Stopping Cyclotron for NSCL/FRIB

Summary
The Facility for Rare Isotope Beams (FRIB) plans to build a gas-stopping cyclotron to stop fast rare-isotope beams for study in a wide variety of experiments. This project will characterize the full capabilities of the gas-stopping cyclotron through computer simulation, allowing for optimization and improved operation at FRIB.

Company
Ridgetop Group, Inc.
3580 West Ina Road
Tucson, AZ 85741-

Title
High-Performance ADC for Particle Accelerator Instrumentation Applications

Summary
This project will design an analog-to-digital converter (ADC) circuit that is needed in nuclear physics experiments. The radiation-hardened, high-performance ADC has also very wide applicability to commercial and military communication systems and radar systems.

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TOPIC: Nuclear Physics Instrumentation. Detection Systems and Techniques

Company
Integrated Sensors, LLC
2403 Evergreen Road
Ottawa Hills, OH 43606-2323

Title
High-Performance Plasma Panel Based Micropattern Detector

Summary
A low mass, position sensitive, fast, charged particle radiation detector is proposed for a variety of applications in nuclear physics including the DOE-HRIBF accelerator. Integrated Sensors is teamed on this project with the Physics Division at Oak Ridge National Laboratory.

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

Title
Novel Polishing Process to Fabricate Ultra Low Thickness Variation Diamond Substrates for Next Generation Beam Tracking Detectors

Summary
This project will develop a novel technology to produce ultraflat diamond crystals that may lead to advancement in the fields of nuclear physics research, xray, optical, and next generation computer applications.

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

Title
Proximity Charge Sensing Electrodes for Semiconductor Detectors

Summary
Single and double sided strip detectors for imaging purposes have numerous physics and homeland security applications. This project will develop a novel sensing scheme that will significantly advance the state-of-the-for very high resolution high purity Germanium segmented strip detectors.

Company
Phds Co.
3011 Amherst Road
Knoxville, TN 37921-

Title
Thin-Window P-Type Point-Contact Germanium Detectors for Rare Particle Detection

Summary
A new thin contact technology will be made viable to low-background germanium detector systems. These detector systems will provide unprecedented sensitivity for pure-science measurements, programmatic security measures, and clinical molecular-imaging applications supported by the Department of Energy.

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

Title
Low Cost, Efficient, Room Temperature Semiconductor Gamma-Ray Detectors

Summary
High performance gamma-ray detectors that operate at room temperature are critical to many applications including nuclear physics. This project will develop a high performance, low cost detector for next generation nuclear physics experiments.

Company
Xemed, LLC
16 Strafford Avenue
Durham, NH 03824-1908

Title
Polarized 3He Pressurization Loop for an Electron Beam Target

Summary
A high pressure target filled with polarized helium-3 for the Continuous Electron Beam Accelerator Facility at Jefferson Laboratory will improve studies of the internal structure of the neutron. This target will increase experimental data rates by a factor of 100 opening an entire new regime of nuclear physics experiments.

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TOPIC: Nuclear Physics Isotope Science and Technology

Company
Isotherapeutics Group LLC
1004 S. Velasco
Angleton, TX 77515-5250

Title
High Specific Activity Sm-153 by Post Irradiation Isotope Separation

Summary
If successful, this project will provide a new method for producing higher purity radiochemicals that will have broader applications for and greater efficiency in the treatment of various cancers and other diseases.

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TOPIC: Deactivation and Decommissioning

Company
Chromologic, LLC
133 N. Altadena Drive
#307
Pasadena, CA 91107-7325

Title
Pipeline Radionuclide Identification and Mapping (PRIAM) System

Summary
The proposed instrument will make possible extended length fiber-optic radiation detection – leading to practical automated low-cost identification and mapping of radiation in a very wide range of environments; a goal which is crucial to long term environmental protection and remediation, as well as security and defense related activities.

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TOPIC: In Situ Remediation

Company
Sky Research, Inc.
445 Dead Indian Memorial Road
Ashland, OR 97520-9706

Title
Hydrogeophysical Monitoring Software Development

Summary
This project will develop a software system which will allow for effective hydro geophysical monitoring.

Company
Precision Combustion, Inc.
410 Sackett Point Road
North Haven, CT, CT 06473-

Title
Steam-Based In-Situ Soil Remediation

Summary
This project will demonstrate a novel concept for lower capital, energy and operating cost rapid remediation of hazardous waste sites, especially those contaminated with mercury.

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TOPIC: Remote Sensing

Company
Svt Associates, Inc.
7620 Executive Drive
Eden Prairie, MN 55344-

Title
High-Detectivity VLWIR Type-II Superlattice Infrared Photo Detectors

Summary
This project seeks to create a new generation of long wavelength infrared light detectors and cameras that operate with greater sensitivity and reliability. Such infrared cameras are useful in remotely identifying chemicals and heat patterns emitted by distant objects.

Company
Thermodynamic Films LLC
7224 General Kearny Ct. NE
Albuquerque, NM 87109-6304

Title
No-Vibration Agile Cryogenic Optical Refrigerator

Summary
The University of New Mexico and Thermodynamic Films LLC are developing a laser technology that cools spaceborne radiation detectors and infrared imagers in satellites where weight and lack of vibration are especially important.

Company
Mesa Photonics, LLC
1550 Pacheco St
Santa Fe, NM 87505-3914

Title
Chemical Remote Sensor for Proliferation

Summary
This project will design and build an optical receiver – containing the optics and electronics – needed for remote sensing; demonstrating sensing capabilities in the laboratory using solid-state light sources in place of the sun; and, field testing the device by direct comparison with a well-established measurement method.

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TOPIC: Radiation Detection

Company
Capesym, Inc.
6 Huron Drive
Suite 1B
Natick, MA 01760-1325

Title
Novel Method for Growth of Detector-Grade CZT Crystals

Summary
This project is focused on development of a novel method for production of semiconductor material for detection of X- and ?-ray radiation with applications in nuclear science, homeland security inspection, medicine, and geophysics.

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

Title
High Z Semiconductor Gamma-Ray Detector for Nuclear Non-Proliferation

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: Global Nuclear Safeguards Research and Development

Company
Dirac Solutions Inc.
6773 Sierra Ct., Suite C
Dublin, CA 94568-2650

Title
Ultra-Secure RF Tags for Safeguards and Security

Summary
This project builds on the work of the DOE national laboratories to develop UHF and Ultra-wideband (UWB) RFID tags for safeguards and security needs in the DOE and other agencies. The resulting tags will be reliable, perform in harsh environments, and incorporate sophisticated security features.

Company
X-ray Optical Systems, Inc.
15 Tech Valley Drive
East Greenbush, NY 12061-4134

Title
Ultra-High Energy X-Ray Optics for Improved Assay of Nuclear Materials

Summary
This project will develop a measurement technique to substantially improve the ability of global nuclear safeguards monitoring in the U.S. and worldwide. This same technology will be used to improve the safety and efficiency of commercial nuclear generation and storage of nuclear materials.

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TOPIC: Radionuclide Monitoring for Nuclear Explosions

Company
Creare Incorporated
16 Great Hollow Road
P.O. Box 71
Hanover, NH 03755-3116

Title
Gas Bearing Centrifugal Compressor System for Radioxenon Monitoring

Summary
Creare Incorporated is developing an advanced gas-bearing compressor system that will improve the ability to detect nuclear weapon tests around the world.

Company
Creare Incorporated
16 Great Hollow Road
P.O. Box 71
Hanover, NH 03755-3116

Title
A Wide Temperature Range, Reliable, Compact Cryogenic Thermal Switch

Summary
The proposed technology will improve the effectiveness of nuclear explosion monitoring systems and thus enhance national security. The technology also has applications in commercial and scientific communication systems and advanced detection systems.

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TOPIC: Advanced Separations Chemistry Tools

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

Title
Development of a Highly Selective Exchange Resin for Ga(III) Sequestration

Summary
The proposed technology will improve the recovery of gallium while reducing environmental impact, material costs, and energy requirements.
Topic
Advanced Separations Chemistry Tools

STTR Project
Company
Microchem Solutions
212 Tisbury Road
Norman, OH 3607-3102

Title
High Pressure Open Channel Electroosmotic Pump

Summary
Develop a serially-connected EOP that consists of alternately-arranged “+” and “-” EOPs and bubbleless electrodes. All components may be on a single chip or several chips that are stacked together. The pump will be capable of producing flow rates of up to 1 µL/min and pressures of up to 1000 psi. These targets will be examined/validated using a nanoflow HPLC pump.

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TOPIC: Advanced Technologies for Nuclear Energy

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

Title
Rod Control System On-Line Condition Monitoring and Advanced Diagnostics for Existing and Next Generation Nuclear Power Plants

Summary

This proposal offers to enhance the rod control system of existing and new nuclear reactors with diagnostic capabilities to provide better monitoring, component health, and automated rod movement measurements. This can help reduce unplanned reactor trips and shorten refueling outage times.

Company
Interwav, Inc.
714 College Street
Bedford, VA 24523-1932

Title
Method for the Nondestructive Detection of Cracking in Cast Stainless Steel Components

Summary
Proposed is a state-of-the-art an ultrasonic method for detecting and sizing cracks in cast stainless steel materials used in some reactor vessel designs. Current techniques have proven to be ineffective in detecting safety related flaws creating potential safety issues for current and future nuclear power facilities.

Company
Luna Innovations Incorporated
1 Riverside Circle
Roanoke, VA 24016-

Title
High Radiation Fluence Tolerant Temperature Sensors for In-Core Use

Summary
A high stability temperature sensor with materials characterization capabilities is proposed for nuclear reactor use which supports the Gen-IV and Nuclear Hydrogen Initiatives. This sensor will enable safe operation of these new reactors at peak efficiencies, which in turn will reduce the US dependency on foreign oil while simultaneously reducing emission of green house gasses.

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

Title
Non-Contact, High Speed Inspection of Zirconium Power Plant Components

Summary

This project will develop new, deeply penetrating solid-state sensor arrays for through wall inspection of nuclear power plant components.

Company
Sporian Microsystems, Inc.
515 Courtney Way Suite B
Lafayette, CO 80026-8821

Title
Advanced SiCN Materials and Sensors for Generation IV Reactors

Summary
A novel high temperature ceramic material and sensing technology is proposed to support the design and safe operation of Generation IV nuclear power systems.

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TOPIC: Advanced Concepts and Technology for High Intensity Accelerators

Company
Snake Creek Lasers, LLC
61 Railroad Ave
Hallstead, PA 18822-9236

Title
High Average Power Cryogenic Lasers For Laser Stripping Applications

Summary
This project will utilize unique ultrafast cryogenic laser technology to develop a high average power cryogenic laser for a state-of-the-art proton source, called Project X, which will be the anchor for the Fermi National Accelerator Laboratory in Batavia, Illinois, physics program for the next several decades.

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

Title
Innovative Nonlinear Hadron Accelerator Designs to Extend the Intensity Frontier

Summary
Next-generation particle accelerators, used to study the fundamental nature of matter, will require ever higher-intensity beams. New ideas and software are being developed to reduce beam loss and, hence, to reduce cost and technical risk.

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

Title
High-Efficiency Power Amplifiers for 325 and 650 MHz

Summary
Accelerators used by DoE for nuclear-physics research require huge amounts of electrical power. The proposed grant will develop high-efficiency power amplifiers that will significantly reduce electricity consumption, thus reducing operating costs, importation of foreign petroleum, pollution, and greenhouse-gas emissions.

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Low-Cost Two-Stage Magnetron with Power Control for Project X

Summary
A low-cost two-stage magnetron amplifier based on the principle of reflection amplifiers will be developed to suppress beam disturbances from the acoustic noise in SRF cavities at Project X and other state of the art high energy proton or heavy ion linear accelerators.

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Highly Efficient Sources of Negative Hydrogen Ions

Summary
An ion source is being developed to enable higher intensity proton beams with better reliability and improved efficiency for the Fermilab Project X linear accelerator and for many other powerful particle accelerators used in science, industry, and homeland defense.

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

Company
Ridgetop Group, Inc.
3580 West Ina Road
Tucson, AZ 85741-

Title
Radiation-Hardened Adjustable Sample Rate ADC for Particle Detectors

Summary
This project will design a high-performance analog-to-digital converter (ADC) with extreme radiation tolerance using the IBM 130 nm Silicon Germanium (SiGe) fabrication process and targeting the scheduled upgrade of the large Hadron collider (LHC) experiment at CERN. No other ADCs that are tolerant to the extreme radiation levels of the scheduled experiment are currently available.

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

Title
Wafer-Scale Geiger-mode Silicon Photomultiplier Arrays Fabricated Using Domestic CMOS Fab

Summary
A single-photon-sensitive detector technology, manufactured using domestic CMOS suppliers, will be made available to system developers using 3D circuit stacking technology to configure high-performance detector arrays.

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TOPIC: High Energy Physics Computer Technology

Company
Semantic Designs Inc.
13171 Pond Springs Road
Austin, TX 78729-7102

Title
Refactor++ Software Engineering Tool

Summary

Semantic Designs, and Austin Texas based company will develop industry leading tools to make existing software more cost effective. By enabling tool assisted “refactoring” software that the U.S. Government and commercial industry spends billions of dollars to maintain will be greatly improved in quality and made easier to enhance.

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TOPIC: High Energy Physics Detectors

Company
Integrated Sensors, LLC
2403 Evergreen Road
Ottawa Hills, OH 43606-2323

Title
Plasma Panel Based Particle Detector for High Energy Physics

Summary
A novel, low cost, high performance, radiation detector with improved capability is proposed for a variety of applications in high energy physics, including the Super Large Hadron Collider at CERN. Integrated Sensors is teamed on this project with the ATLAS Muon Detector Group at the University of Michigan, Physics Department.

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

Title
Digital Silicon Photomultiplier Array Readout Integrated Circuits

Summary
Using domestic CMOS foundries, a single-photon-sensitive detector technology will be made available in large-array formats so that they can be used by system developers to configure high-performance instruments using 3D circuit stacking technology.

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

Company
Accelerator Technology Corp.
9701 Valley View Dr.
College Station, TX 77845-

Title
Textured-Powder Jelly-Roll Process for High-Performance Bi-2212/Ag Wire

Summary
A new method is being developed to improve the performance of superconducting wire. By orienting the particles of superconductor it is possible to make the superconducting core of the wire denser and more conductive. If successful the development would open important capabilities for energy research, and also improve performance for the superconducting windings for motors and generators.

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

Title
Increasing the Jc of Tube-Type Nb3Sn Strands

Summary
This program pursues the development of Nb3Sn conductors for applications in High EnergyPhysics. The aim is to increase the current carrying capability of Nb3Sn strands, improvestability of the strand because of the high filament count, and improve wire design so as to be better cabled without filament breakage. Additionally, such strands will be of benefit to lower the cost of advanced high field MRI's and medical applications.

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

Title
Reduce Nb3Sn Strand Deformation when Fabricating High Jc Rutherford Cables

Summary
This program pursues the development of Nb3Sn conductors for applications in High Energy Physics. The aim is to increase the current carrying capability of Nb3Sn strands, improve stability of the strand because of the high filament count, and improve wire design so as to be better cabled without subelement breakage and merging. Additionally, such strands will be of benefit to lower the cost of advanced high field MRI's and medical applications.

Company
Shear Form, Inc.

207 Dellwood St.
Bryan, TX 77801-

Title
Tantalum Tube for Diffusion Barriers

Summary
Increased deformability and uniformity in Ta tube used in Nb3Sn superconducting wire will be achieved by an improved materials processing method to refine the microstructure. The improved microstructure will be produced by a severe plastic deformation processing method to reduce the average grain size, improve microstructural uniformity, heal tube seam-welds, improve material ductility, improve Nb3Sn wire performance, and lower Nb3Sn wire manufacturing costs.

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

Title
An Internal Tin Tube Nb3Sn Conductor with Sn-B Core for Improved Non-Copper Critical Current Density

Summary
A superconducting wire will be developed for use in magnets for high energy physics accelerators. This wire will also find use in high frequency nuclear magnetic resonance imaging systems used in cutting edge chemical applications.

Company
Hjc Enterprise LLC
5 Badgley Dr
New Providence, NJ 07974-2501

Title
Improving High Field Critical Current Density of Nb3Sn Superconductor

Summary
High field magnet is an essential component for a number of advanced fields of science such as NMR and ICR (widely used in drug discovery), magnetic fusion (searching ever lasting energy), and particle accelerator used for high energy physics. This study is to improve the performance of Nb3Sn, a superconducting material widely used in such magnet.

STTR Project

Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Fiber Optic Quench Detection Via Optimized Rayleigh Scattering in High-field YBCO Accelerator Magnets

Summary
YBCO coated conductors offer the potential of generating the highest magnetic fields possible with superconducting materials. A new approach to protecting YBCO magnets is essential and will be investigated here.

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TOPIC: Accelerator Technology for the International Linear Collider

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

Title
High Power Rf Testing Of A 3-Cell Superconducting Traveling Wave Accelerating Structure

Summary
We plan to develop a new type of superconducting accelerating technology for the International Linear Collider project to be able to increase the accelerating electric field and, therefore to reduce the length (and hence the cost) of the accelerator.

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

Title
10 MW, L-Band Annular Beam Klystron

Summary
This project will develop a 10 MW, 1.3 GHz annular beam klystron (ABK). The advanced design of the ABK is expected to result in system costs that are significantly lower than those possible with conventional klystrons. The ABK will be useful for research and medical accelerators, and other DoD and commercial applications.

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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

Title
Enhanced Transformer Ratio using A Double Triangular Beam Generated using The Emittance Exchange Technique

Summary
As one of the most promising techniques in the category of advanced accelerator concepts for high energy physics research applications, beam driven wakefield accelerators, although capable of producing high accelerating fields, suffer from a lack of efficiency unless a key factor, the transformer ratio, can be enhanced to a high number (>2). The technique we propose in this project can dramatically increase the transformer ratio and obtain a much higher energy transfer efficiency, leading to a breakthrough in the performance of wakefield accelerators.

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

Title
Rapidly Tunable RF Cavity for Accelerators

Summary
This project will develop an innovative accelerating structure for use in high intensity fixed-field alternate gradient accelerators to be used for basic physics research, industrial, accelerator driven subcritical nuclear reactor, and medical cancer therapy applications.

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

Title
High-Gradient, High-Transformer-Ratio, Dielectric Wake Field Accelerator

Summary
The quest for deepened understanding of the origin of the universe requires continued search for elementary particles, for which high-energy accelerators are necessary tools. This project is to

develop an electron/positron accelerator using a coaxial dielectric structure that could lead to simplified design and relatively low cost.

STTR Project
Company
Muons, Inc.
552 N. Batavia Ave
Batavia, OH 3607-3102

Title
Helical Muon Beam Cooling Channel Engineering Design

Summary
An integrated system of superconducting magnets and RF cavities is being developed to reduce the size of muon beams for muon colliders to enable new ways to investigate nature at fundamental levels at the energy frontier.

Company
Particle Beam Lasers, Inc.
18925 Dearborn Street
Northridge, CA 91324-2807

Title
Innovative Design of a High Current Density Nb3Sn Outer Coil for a Muon Cooling Experiment

Summary
A successful outcome of this study would result in a viable method for producing an intense cold muon beam which will have applications beyond those of a Muon Collider. Commercial applications include muon radiography for medical and Homeland Security applications. The use of intense sources of muons in condensed matter studies, nanotechnology, and other technologies have potential commercial application as well.

Company
Arbor Photonics, Inc.
251 Jackson Plaza
Unit A1
Ann Arbor, MI 48103-1955

Title
Incoherent Fiber-Laser Array Pumped OPCPA Laser-Plasma Accelerator Driver

Summary

A novel laser system makes compact, tabletop-sized accelerators more realistic, and can dramatically increase the rate of acceleration possible with traditional high energy particle accelerators without dramatic increases in machine dimensions, all the while putting the cost within reach of a much larger range of university and institutional research labs.

Company
Advanced Energy Systems, Inc.
27 Industrial Blvd.
Unit E
Medford, NY 11763-2286

Title
Ultrafast High-Brightness Electron Source

Summary
AES proposes to develop an ultrafast high-brightness electron source for ultrafast electron diffraction experiments, advances in particle acceleration techniques and improvements in x-ray sources. Improvements in these areas could lead to significant advances in science.

Company
Fm Technologies, Inc.
4431-H Brookfield Corporate Dr
Chantilly, VA 20151-1691

Title
X-Band Bunched Electron Injector

Summary
This project will develop a radio-frequency accelerator that will provide a high power, source suitable for many applications. Of particular importance are medical cancer therapy linacs, sterilization and research injectors.

Company
Magiq Technologies, Inc.
11 Ward Street
Somerville, MA 02143-4214

Title
Real Time Optical Network for Accelerator Control

Summary
This project will develop a fiber optic-based synchronization and communication system for control of next-generation light sources and new applications in test and measurement industry.

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TOPIC: Radio Frequency Accelerator Technology for High Energy Accelerator and Colliders

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

Title
A New Conical Half-Wave Superconducting Cavity

Summary
This project will design a new kind of superconducting cavity that reduces cost by occupying less space in a proton accelerator.

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

Title
High Gradient Test of a Standing Wave Dielectric Loaded Accelerating Structure

Summary
An ultra-high gradient (acceleration rate) is preferred for cost and other reasons in future high energy collider designs. The standing wave Dielectric Loaded Accelerating (DLA) structure proposed for this project has a unique possibility of achieving a very high gradient with a low rf power requirement. Therefore, it will allow the demonstration of high gradients in DLA structures or hit the rf breakdown limit, where the high fields begin to damage the DLA. Either result will help increase the pace of dielectric accelerator development. The proposed project, if it proceeds, will benefit the high gradient accelerator research community. The data from these tests will provide a broader view for investigating the high gradient and rf breakdown issue.

Company
Strategic Polymer Sciences Inc.
200 Innovation Boulevard
Ste 237
State College, PA 16803-

Title
Unconventional Compact Wound Glass Capacitors for Pulsed Power System in RF Accelerators

Summary
This program will develop unconventional compact flexible glass capacitors with ultrahigh energy density, high reliability, and low cost. The advanced capacitors can be used in military pulsed power weapon systems, medical defibrillators, hybrid electric vehicles, wind turbine, and photovoltaic panels.

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TOPIC: Advanced Technologies and Materials for Fusion Energy Systems

STTR Project
Company
Nanohmics, Inc.
6201 E. Oltorf
Suite 400
Austin, OH 3607-3102

Title
Laser Cladding Modeling and Operation Applied to Plasma Facing Components

Summary
To address the need for cost effective plasma facing materials Nanohmics, Inc. and Dr. Y.C. Shin of Purdue University are developing an extensive model and manufacturing capability for refractory coated materials suitable for PFC applications. The resulting process and material will be manufactured in a commercial setting and will further augment Nanohmics effort in commercializing the state of the art machining capability being developed at Purdue University.

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

Title
Increase Jc by Improving the Array of Nb3Sn strands for Fusion Application

Summary
We are developing a much improved lower cost Nb3Sn superconductor wire for DOE advanced Fusion Program.

Company
Materials & Systems Research, Inc.
5395 West 700 South
Salt Lake City, UT 84104-4403

Title

Advanced Method of Joining RAFM/ODS Steels for Fusion Reactors

Summary
Fusion power would provide much more clean energy for a given weight of fuel than any technology currently in use. Advanced welding technology is being developed that will allow high quality joining of materials to build future fusion energy systems.

Company
Ultramet
12173 Montague Street
Pacoima, CA 91331-2210

Title
Textured Tungsten Armor Coating for Fusion Energy Applications

Summary
Nuclear fusion offers a technically viable means of generating energy consistent with current consumption levels and environmental preservation. Establishing the commercial viability of fusion requires the development of advanced materials and structures that allow reliable operation in the demanding reactor environment.

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TOPIC: Fusion Science and Technology

Company
Virginia Diodes, Inc.
979 Second Street SE
Charlottesville, VA 22902-6172

Title
Robust and Reliable Receivers for the ITER ECE System

Summary
VDI will develop a new generation of terahertz receivers with unprecedented performance and reliability. These receivers will be optimized for use as a diagnostic instrument on ITER, a joint international research and development project that will demonstrate the feasibility of clean and inexpensive fusion energy.

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

Title

A High-Power, Broadband Window for Step-Tunable Gyrotrons

Summary
Successful development of a broad band, high power window for gyrotrons will enable development of these devices for more efficient heating and instability suppression in fusion research devices. These would find application at fusion research facilities around the world.

Company
Lodestar Research Corporation
2400 Central Ave. P-5
Boulder, CO 80301-2843

Title
ArbiTER: A Flexible Eigenvalue Solver for Edge Fusion Plasma Applications

Summary
This project will develop sophisticated computer software for analysis and verification of plasma simulation codes, and for theoretical studies of basic plasma physics. These simulation codes are increasingly employed to understand, predict and optimize the performance of fusion energy production for laboratory experiments and the international ITER project.

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

Title
Non-Linear Modeling of RF in Tokamaks

Summary
A difficult-to-analyze non-linear parasitic-power-loss mechanism which occurs in RF heating of magnetic fusion experiments will be studied with a combination of two methods, each of which has seen recent progress that enables their application to this challenging problem. If successful, the approach will help resolve observed uncertainties in fusion experiments.

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

Title
High Gain and Frequency Ultra-Stable Integrators for ICC and Long Pulse ITER Applications

Summary
The proposed work seeks to develop an ultra stable long pulse integrator for the fusion energy community.

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

Title
Rapid, High Power, Dense Plasma Jet Delivery System for Critical Magnetic Fusion Problems

Summary
Plasma jets have many important applications in magnetic fusion energy research. A rapid, high power, dense plasma jet delivery system with the real-time capability to solve the critical problem of disruption mitigation on ITER can also provide significant enhancement to other fusion and high energy density physics programs.

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TOPIC: High Energy Density Plasmas and Inertial Fusion Energy

Company
Nlight Photonics Corporation
5408 NE 88th Street, Bldg E
Vancouver, WA 98665-0990

Title
High Efficiency kW-Class Semiconductor Laser Bars for Inertial Fusion Energy

Summary
The current state-of-the-art performance and cost structure of semiconductor diode lasers is insufficient to meet the needs of laser inertial fusion energy. This project will design a new class of high power semiconductor lasers that will provide significant benefit to the power, efficiency, and reliability of these pump sources as an essential step towards making fusion energy a practical reality.

STTR Project
Company
Npl Associates, Inc.
912 W. Armory Drive
Champaign, OH 3607-3102

Title
D-Cluster Converter Foil for Laser-Accelerated Deuteron Beams: Towards Deuteron-Beam-Driven Fast Ignition

Summary
An ultra-high-density deuterium cluster material is proposed to serve as a basis for deuteron beam generation in order to fast ignite ICF fuel. This material will secure the ion flux and at the same time provide “bonus” energy gain owing to beam-target fusion. If successful, this approach will be the most efficient way of igniting the DT fuel, making the near-term commercialization of ICF fusion more achievable.

Company
Prism Computational Sciences, Inc.
455 Science Drive
Suite 140
Madison, WI 53711-1067

Title
Development of Radiation and Atomic Physics Modeling to Support High-Fidelity Simulation of HEDLP Experiments

Summary
The study of high energy density plasmas is important for many basic science areas, including astrophysical plasmas and the development of inertial fusion as an energy source. This project will develop software that will aid in the study of these plasmas, and be suitable for university, government, and commercial research.

Company
Research Applications Corporation
148 Piedra Loop
Los Alamos, NM 87544-3837

Title
The ePLAS Code for Ignition Studies

Summary
The study of high energy density plasmas is important for many basic science areas, including astrophysical plasmas and the development of inertial fusion as an energy source. This project will develop software that will aid in the study of these plasmas, and be suitable for university, government, and commercial research.

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TOPIC: Flywheel Energy Storage

Company
Beacon Power Corporation
65 Middlesex Road
Tyngsboro, MA 01879-2041

Title
Development of a High-power Motor/Generator for the ARPA-E Hub-Less Flywheel

Summary
Critical components for a low cost “flying ring” hub-less flywheel under the GRIDS program is currently under development/ For this low-cost flywheel to be applicable to shorter duration grid applications, the power capability must be increased. This project will investigate both material and configuration improvements to allow a four-times increase in power capacity.

STTR Project
Company
Calnetix, Inc.
23695 Via Del Rio
Yorba Linda, OH 3607-3102

Title
Shaft-less, Hub-less High Strength Steel Flywheel

Summary
This flywheel system provides (1) boost power to maintain frequency regulation at power plants for massive blackout prevention (2) temporary large scale energy storage at solar or wind farms to store energy that is not needed when it was produced but can be transmitted during times of increased demand.

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