arpa·e
CHANGING WHAT'S POSSIBLE

LENR – Low Energy Nuclear Reactions

PROJECT DESCRIPTIONS

University of Michigan — Ann Arbor, MI

Ionizing Radiation Detection for Exploratory Experiments in Low-Energy Nuclear Reactions - $902,213

University of Michigan will provide capability to measure hypothetical neutron, gamma, and ion emissions from LENR experiments. Modern instrumentation will be coupled with best practices in data acquisition, analysis, and understanding of backgrounds to interpret collected data and evaluate the proposed signal.

University of Michigan — Ann Arbor, MI

Systematic Evaluation of Claims of Excess Heat Generation From Deuteration Of Palladium-Nickel Nanocomposites - $1,108,412

The University of Michigan proposes to systematically evaluate claims of excess heat generation during deuteration and correlate it to nuclear and chemical reaction products. The team plans to combine scintillation-based neutron and gamma ray detectors, mass spectrometers, a calorimeter capable of performing microwatt-resolution measurements of heat generation, and ab-initio computational approaches. The proposed research will experimentally and theoretically explore the origin and mechanisms of excess heat generation and LENR.

Texas Tech University — Lubbock, TX

Advanced Materials Characterization and Nuclear Product Detection for LENR - $1,150,000

Texas Tech University will develop accurate materials fabrication, characterization, and analysis to attempt to resolve the physical understanding of Low-Energy Nuclear Reactions (LENR). Texas Tech will also provide advanced detection of nuclear reaction products as a resource for ARPA-E LENR Exploratory Topic teams.

Lawrence Berkeley National Laboratory — Berkeley, CA

Quantifying Nuclear Reactions in Metal Hydrides at Low Energies - $1,500,000

LBNL team proposes to probe for LENR at external excitation energies below 500 eV, systematically varying materials and conditions while monitoring nuclear event rates with a suite of diagnostics. The team will draw from knowledge based on previous work using higher energy ion beams as an external excitation source for LENR on metal hydrides electrochemically loaded with deuterium.

Massachusetts Institute of Technology — Cambridge, MA

Neutron Emission from Laser-Stimulated Metal Hydrides - $2,000,000

Massachusetts Institute of Technology (MIT) proposes a hypothesis-driven experimental campaign to examine prominent claims of low energy nuclear reactions (LENR) with nuclear and material diagnostics, focusing on unambiguous indicators of nuclear reactions such as emitted neutrons and nuclear ash with unnatural isotopic ratios. The team will develop an experimental platform that thoroughly and reproducibly test claims of nuclear anomalies in gas-loaded metal-hydrogen systems.

Stanford University — Redwood City, CA

Nuclear Product Detection from Deuterated Nanoparticles Under Phonon Stimulation - $1,500,000

Stanford University will explore a technical solution based on LENR-active nanoparticles and gaseous deuterium. The team seeks to alleviate critical impediments to test the hypothesis that LENR-active sites in metal nanoparticles can be created through exposure to deuterium gas.

Energetics Technology Center — Indian Head, MD

CATHODE (CATHode scintillatOr Detector for Electrochemistry) - $1,500,000

Energetics Technology Center will build upon past successes with co-deposition experiments using palladium, lithium, and heavy water together to create an environment in which LENR can occur. These electrolysis experiments decrease the distance from the cathode (location of LENR) to an electronic detector capable of detecting nuclear reaction products to give these experiments the best chance at reliably detecting nuclear reactions, if they are present.

Amphionic LLC — Dexter, MI

Nanostructured Pd-Anf Composites for Controlled LENR Exploitation - $295,924

Cathode structure and surface morphology are thought to be essential for LENR reaction rate. Amphionic proposes to optimize cathode design to form Pd-polymeric composites within which the Pd nanoparticle size and shape are varied, and the interfacial separation and geometry are controlled. Experiments will focus on exploring if LENR are produced in potential wells existing between two nanoscale surfaces by controlling metal nanoparticle (NP) geometry, separation, composition, and deuterium loading.