Diagnostic Resource Teams to Support the Validation of Potentially Transformative Fusion-Energy Concepts

LAWRENCE LIVERMORE NATIONAL LABORATORY

ABSOLUTE NEUTRON RATE MEASUREMENT AND NON-THERMAL/ THERMONUCLEAR FUSION DIFFERENTIATION - $1,326,530.00

Principal Investigator: Drew Higginson

Design, build and operate a robust, portable neutron detection system that will serve as a powerful diagnostic tool in support of efforts to transform fusion energy. The tool's design will allow for a flexible and mobile experimental setup, enabling it to provide effective, expertly calibrated, diagnostic measurements at multiple fusion facilities.

LOS ALAMOS NATIONAL LABORATORY

PORTABLE SOFT X-RAY DIAGNOSTICS FOR TRANSFORMATIVE FUSION-ENERGY CONCEPTS - $630,000.00

Principal Investigator: Glen Wurden

Develop a portable suite of soft x-ray diagnostics to characterize the performance of a number of fusion energy concepts. The tool will estimate core electron temperature, and use time resolved spectroscopy to monitor the time evolution of experimental fusion plasmas. With the use of a framing camera, the team also expects to be able to identify hot regions and structures in the plasma.

OAK RIDGE NATIONAL LABORATORY

A PORTABLE DIAGNOSTIC PACKAGE FOR SPECTROSCOPIC MEASUREMENT OF KEY PLASMA PARAMETERS IN TRANSFORMATIVE FUSION ENERGY DEVICES - $1,106,000.00

Principal Investigator: Theodore Biewer

Assemble a portable diagnostic package to make measurements of key plasma parameters, including electron temperature. Unprecedented diagnostic portability will be achieved through innovative use of off-the-shelf components and specialized, highly portable lasers. This portable diagnostic package will be capable of providing radial profiles of electron density and temperature as well as radial profiles of ion density, temperature, and flow velocity on a variety of fusion energy devices.

LAWRENCE LIVERMORE NATIONAL LABORATORY

A PORTABLE OPTICAL THOMSON SCATTERING SYSTEM - $2,000,000.00

Principal Investigator: Clement Goyon

Implement an optical Thomson scattering diagnostic to measure electron density and temperature, as well as ion temperature. This approach could transform the understanding of the underlying physics of each fusion concept by providing local, time resolved measurements of plasma conditions.

PRINCETON PLASMA PHYSICS LABORATORY

A PORTABLE ENERGY DIAGNOSTIC FOR TRANSFORMATIVE ARPA-E FUSION ENERGY R&D - $290,000.00

Principal Investigator: Samuel Cohen

Build and calibrate a portable diagnostic for measuring ion energies in potentially transformative fusion-power projects. This portable passive charge-exchange stripping-cell ion energy analyzer (SC-IEA), will feature lightweight design, due to modern vacuum equipment and controls. The SC-IEA will measure ion temperature and the ion energy distribution function (IEDF)--understanding and controlling the IEDF is critical to achieving fusion energy.