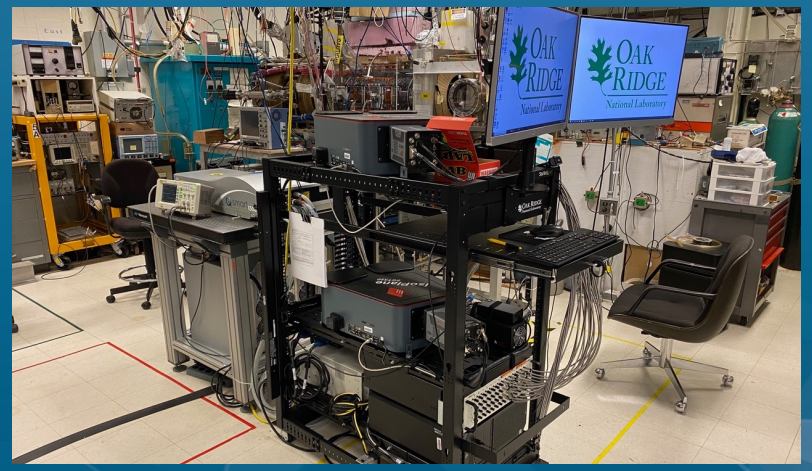
Portable Diagnostic Package, ORNL and Univ. of Tenn.- Knoxville, TN

Oak Ridge National Laboratory

A portable diagnostic package (PDP) provides spectroscopic measurements of key plasma parameters, supported by research personnel from ORNL and UTK.



Contact(s)	**Theodore Biewer**, biewertm@ornl.gov **Drew Elliott**, elliottdb@ornl.gov
Key references/links	**Design and implementation of a portable diagnostic system for Thomson scattering and optical emission spectroscopy measurements** Rev. Sci. Instr. **92**, 063002 (2021); https://doi.org/10.1063/5.0043818

Key Properties	
Physical Property to be Measured	Electron temperature and density, impurity ion temperature and density
Technique	Thomson Scattering (TS) and Optical Emission Spectroscopy (OES)
Plasma parameter range	TS: T_e 2–1000 eV; n_e 10^{19}–10^{21} m^{-3}; OES: T_i 2–100 eV
Resolution (time)	TS: 10 ns, OES: >1 μs
Resolution (space)	TS: 11 chords, ~>1 mm/chord, OES: 11 chords
Interface	System: 120-V AC power, synchronization trigger. TS: 2 ports for laser entry and exit, 1 port for light collection OES: 1 port for light collection Standard 1-3/8” or 2-3/4” conflat ports typically used.
Suitable for MCF, ICF, MIF?	Typically for magnetically confined fusion plasmas
Form factor: transport	Fits in a van
Form factor: operation	3x3x4 ft optical table for laser, 2x5x6 ft cart for instrumentation
Set-up time	OES: <1 week to measurement, TS: ~10 weeks to physics measurement including laser alignment and calibrations
Minimum time for a measurement	TS: 10-Hz laser rep rate, OES: 2-ns phosphor gate time
Other characteristics	On-board data acquisition and processing
Special considerations	Class-IV laser safety protocols required
Physical Property to be Measured	Electron temperature and density, impurity ion temperature and density