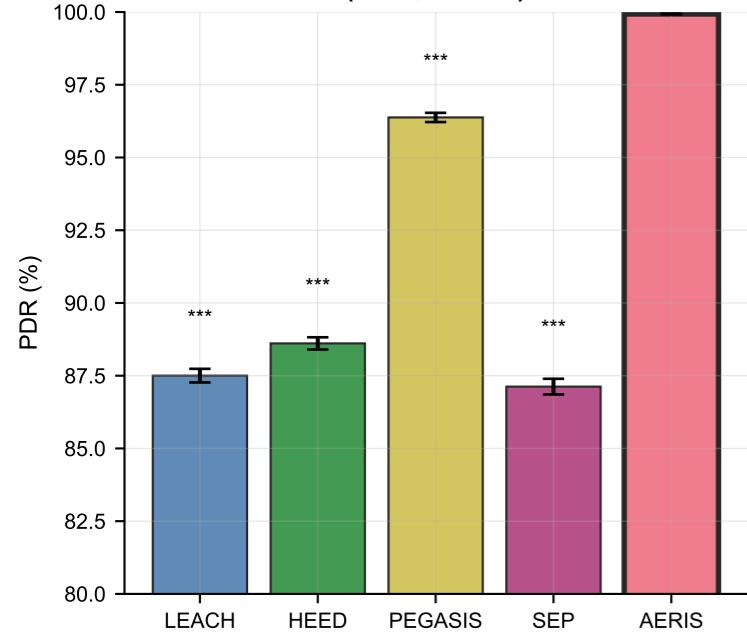
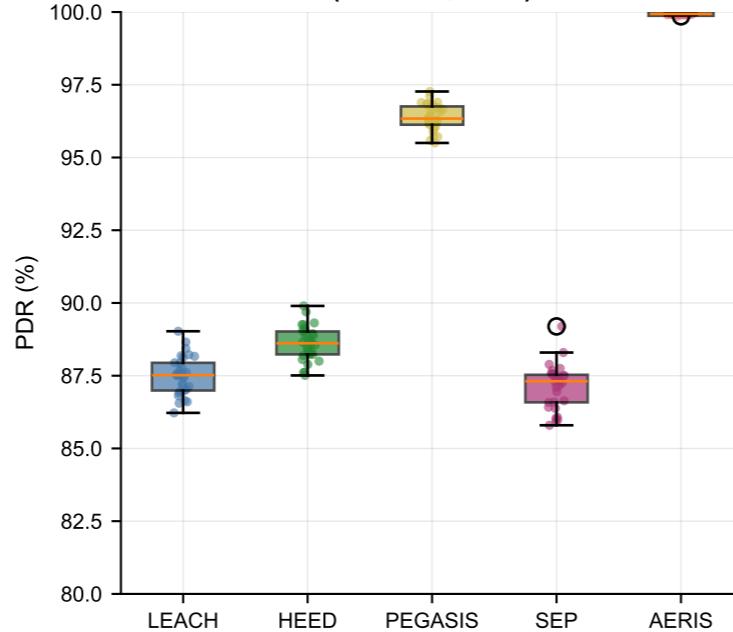


**AERIS: SOTA Protocol Comparison with Rigorous Statistical Testing**  
 (Same geometry/energy model; AERIS includes full reliability stack, n=30 runs each)

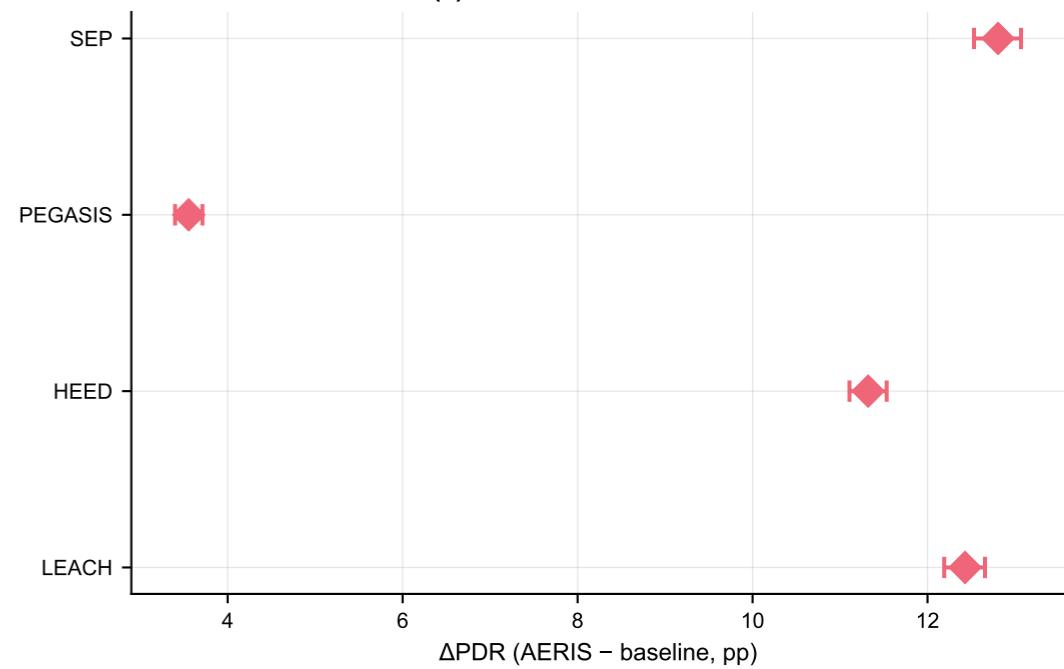
**(a) Protocol PDR Comparison  
(n=30, 95% CI)**



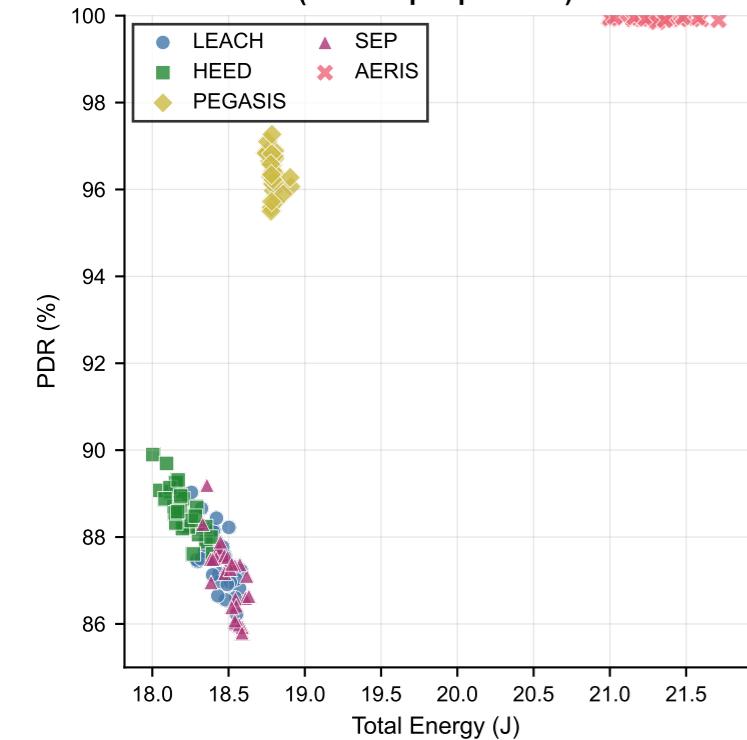
**(b) PDR Distribution  
(Box Plot, n=30)**



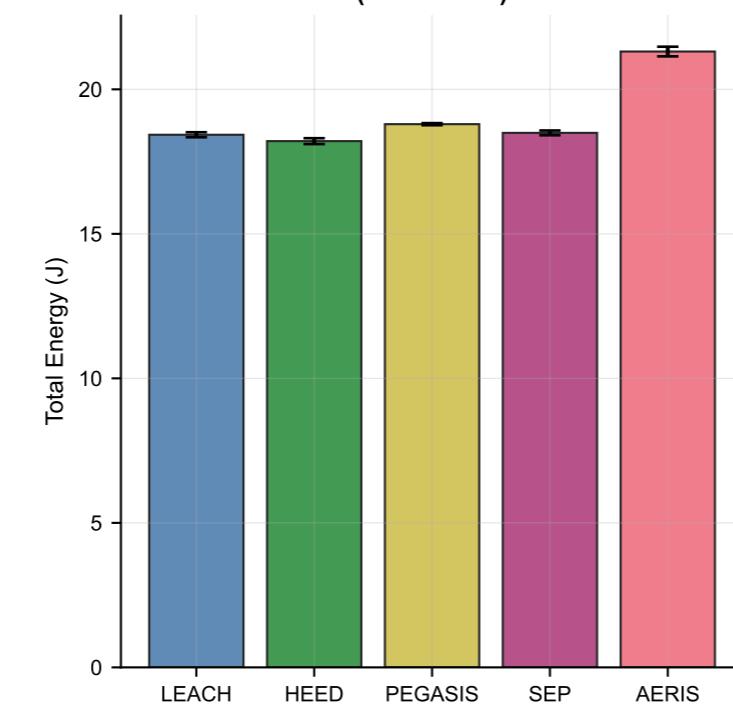
**(c) PDR Gain vs Baselines**



**(d) PDR–Energy Trade-off  
(30 runs per protocol)**



**(e) Energy Consumption  
(Mean ± SD)**



**(f) Statistical Validation Summary  
(Shapiro-Wilk → Levene → t-test)**

Baseline	Test	p	ΔPDR (pp)	Direction
LEACH	Welch's t-test	1.0e-38	12.43	AERIS higher
HEED	Welch's t-test	6.2e-39	11.32	AERIS higher
PEGASIS	Welch's t-test	5.6e-28	3.55	AERIS higher
SEP	Welch's t-test	2.5e-37	12.81	AERIS higher