

Upgrade	Enables What Capabilities?	Risk / Effort / Cost Assessment	Recommendation
H2RG LWIR array	1-5 um sensitivity, wider FoV	Low / Medium / Low	Pursue
New f/11 optics	Zoom mode for H2RG, R=60,000 with R2 grating	Low / Med / Med	Pursue
ZnSe + Al ₂ O ₃ cross-disperser	Better spacing of orders on array, allow BG subtraction on longer slit for LM bands.	Med / Med / High	Pursue
R6 echelle grating	Yields higher dispersion (R=65,000 to 130,000) with good order placement	High / High / High	Defer
In-house thru-slits in Si	Better delivered spectral resolution and throughput, cheap fabrication	Low / Medium / Low	Pursue, best effort basis
Calibration unit atop ARIES or in AO topbox	Flat-field data in-situ with low observational overhead and much better quality	Low / Med / Med	Pursue
2 nd axis adjustment of echelle grating	Selection of YJHK or KLM bands w/o opening instrument	Med / Med / Low	Pursue
Spilt-light slit guiding	Better tracking, especially through transit	Low / Med / Low	Pursue, best effort basis
Improve electronics integration	Make ARIES supportable at telescope. Broaden support team	Low / Med / Low	Pursue
Data reduction scripts	More efficient pathway to publication	Low / Med / Med	Pursue, best effort basis

Labor hour estimates

	H2RG	F11 optics	Cross disperser, grating mount	Calibration unit	Electronics integration	Thru slits	R6 grating	Total
Optical design	-	160	160	-	-	-	160	~500
Mechanical design	-	160	160	80	40	40	320	~800
Machining	-	120	160	80	40	40	160	~600
Integration (h/w & s/w)	160	100	160	120	120	160	320	~1100

These estimates are somewhat discrepant with the intent shown in the PEP.