

APO Imager - Budget

Cost Breakdown

E2V CCD231-84-1-E95	\$114,000.00
Optics (lens mfg, coatings, filter set)	\$32,032.00
Electronics (custom and off the shelf items)	\$52,450.00
Machine Shop (metal and labor)	\$45,000.00
Instrument Cart (metal, labor, components)	\$8,000.00
Testing (dewar window, bench test equipment, etc)	\$5,000.00
Travel (to Leach to assist with integration)	\$2,000.00
Total	\$258,482.00

Note: This budget does not include the cost of an ion pump controller with HV cable (\$2K), cryotiger compressor (\$5K), lines (\$2K) and cold head (\$6K). These are items we hope to reuse from SPIcam or current spares.

Item	Vendor	Quote	Cost	Notes
CCD				
CCD231-84-1-E95	E2V	yes	114000	
		subtotal	114000	
Instrument Cart				
Manufacturing, casters, actuators, etc	CVE	no	8000	The SPICam cart can not be used. For space saving it will be worth building a smaller cart
		subtotal	8000	
Optics				
Optic L1	Sierra Precision Optics	quote	15032	
Optic L2	Sierra Precision Optics	quote	0	
Optic L3	Sierra Precision Optics	quote	0	
Coatings	Sierra Precision Optics	quote	0	
CCD Window	N/A	no	0	Will use spare SPICam window for testing
Filter Set, SDSS	Custom Scientific	yes	17000	for 5" square filters, round filters several thousand less for entire set
		subtotal	32032	
Electronics				
Leach Controller w/ Power Supply	Leach	yes	38000	Reuse the cryotiger compressor, coldhead and possibly lines
ICC		no	3000	Estimate
PC-104			2000	Estimate
Lakeshore		yes	2600	model 325 temperature controller
Ion Pump + controller			650	Reuse spicam's ion pump controller
Sensors			1200	3x lakeshore DT-670-MT (2 low precision @\$250/ea, 1 calibrated @ \$600/sensor)
Custom PCB			1500	Estimate based on previous work
Fiber Equipment			1000	Estimate based on similar equipment on hand
Filterwheel motor, encoder, driver, etc			1500	Estimate based on catalog pricing of similar items
Connectors, Wires, Cables			1000	Estimate based on previous work
		subtotal	52450	
Machine shop				
Housing Structure	CVE	no	10000	
Mounting Plate	CVE/UW	no	3000	
Sag support	CVE	no	1000	cve depending on length
Filter Wheels (6)	CVE	no	11000	this includes housing, and 6 interchangeable wheels
Dewar Housing	cve	no	5000	
Dewar Internals	CVE/UW	no	5000	
Shutter	CVE	no	5000	custom shutter for even ccd illumination
Anodizing and Aeroglazing	CVE	no	5000	
		subtotal	45000	Estimate based on gross estimate of hours to make various parts
Testing				
Dewar window adaptor, etc	CVE	no	5000	An adaptor will need to be made to hold the 4" window in place while at Leach,
		subtotal	5000	Test stand for the lab assembly, other misc test fixtures
Travel				
Leach Controller Integration Trip		no	2000	need to bring dewar and ccd
		subtotal	2000	not sure if an additional two trips are needed
TOTAL			258482	

Manpower Estimates

Category	Who	Time (man months)
Optics	Joe	3
Mechanics	Joe	3
Electrical	Ed, Ben	2
Software	Fritz	2
Lab Testing	Joe, Bill	0.5
Integration	Joe, Bill, Ed, Ben	0.5
Commissioning	Joe, Bill, Obs-spec	0.25
	total	11.25