

Science Objective	Science Measurement Requirement	Instrument Functional Requirement	Mission Functional Requirement
Probe the energetics and dynamics of high luminosity regions	Spectrally-resolved maps of the 63 micron [OI] line	4.7 THz heterodyne receivers	SOFIA required for measurable atmospheric transmission
Observe global environments of star formation and cloud dissipation	Large area maps spanning significant fractions of a square degree	Mapping speed >100 arcmin ² per flight leg requires array receiver with 16 spatial pixels	SOFIA flight legs ~3 hours in order to complete a map
Spatially resolve cloud (sub) structure to Galactic Center	<10" angular resolution	>2m primary antenna	2" pointing knowledge
Spectrally resolve interstellar cloud substructure	< 1 km/s velocity resolution	Spectrometers with <16 MHz resolution	1 Mbps data rate
Span large range of Galactic radial velocities	>300 km/s instantaneous velocity coverage	IF & spectrometer bandwidth >5 GHz per pixel	1 Mbps data rate
Measure warm gas participating in large scale shocks & photo-dissociation fronts	Must detect N(O)>2x10 ¹⁷ cm ⁻² , or T _B <1 K kms ⁻¹ in 30 seconds	T _{rec} < 2000K DSB: Hot electron bolometer mixer receivers at 4 Kelvin	Closed cycle 4K cryostat Optimal SOFIA altitude >39 kft