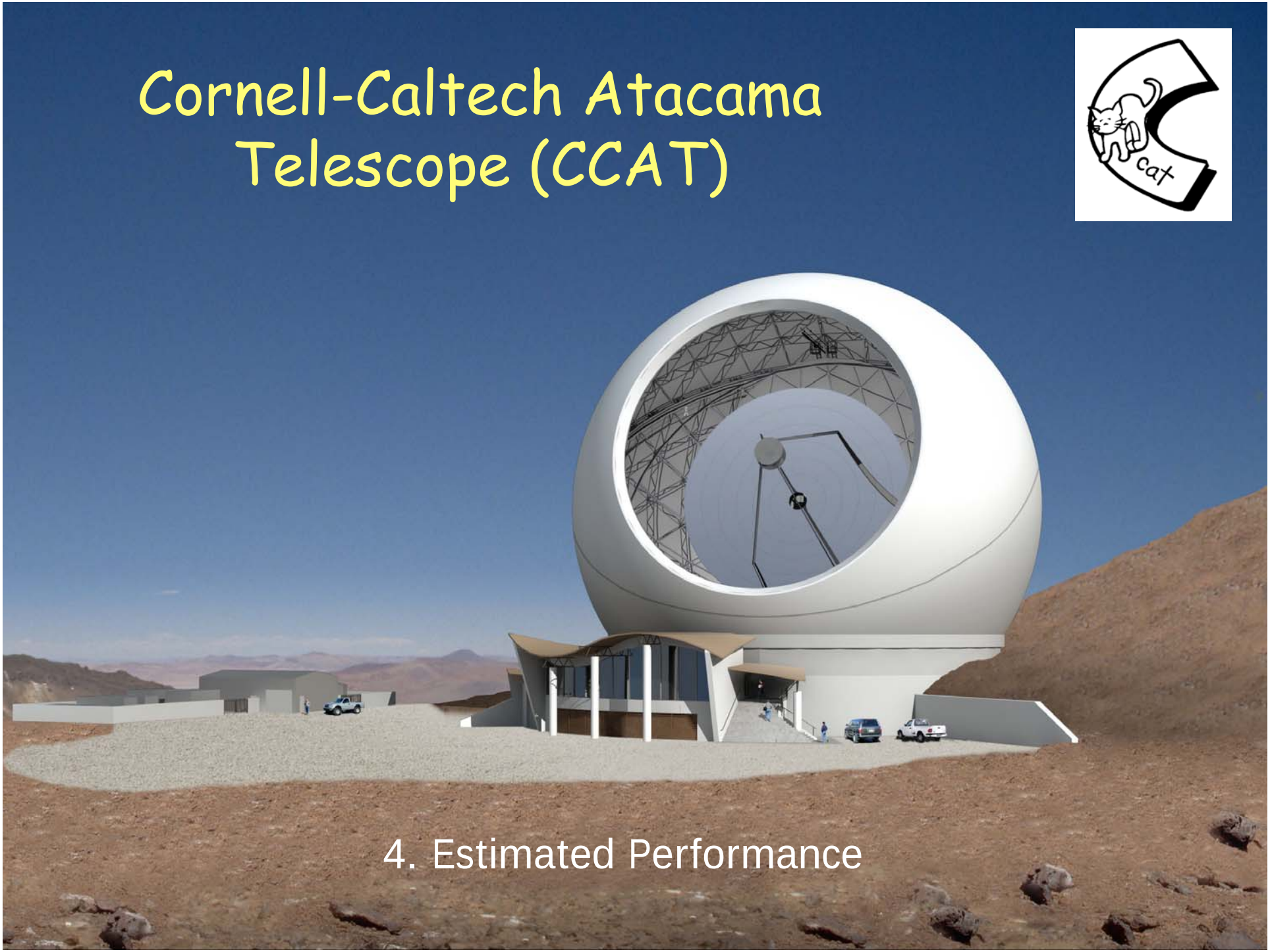
Cornell-Caltech Atacama Telescope (CCAT)



4. Estimated Performance

Performance comparison

Instrument	Wavelength (microns)	F-o-V (sq-arcmins)	NEFD (mJy)	FWHM (arcsec)	Confusion (mJy)
SCUBA	450	4.2	400	7.5	0.25
	850	4.5	80	14	0.5
SCUBA-2	450	50	100	7.5	0.25
	850	50	30	14	0.5
Laboca-S	350	4	250	7	0.3
Laboca	850	11	110	18	0.8
SPIRE	250	32	29	18	2.6
	350	32	34	25	3.8
	500	32	37	35	5.4
AzTec	1100	2.4	3.5	5.5	0.06
MAMBO-2	1200	10	30	10	0.2

The confusion level in this case is simply scaled by aperture area/wavelength from the (measured) SCUBA 850μm 1-σ level

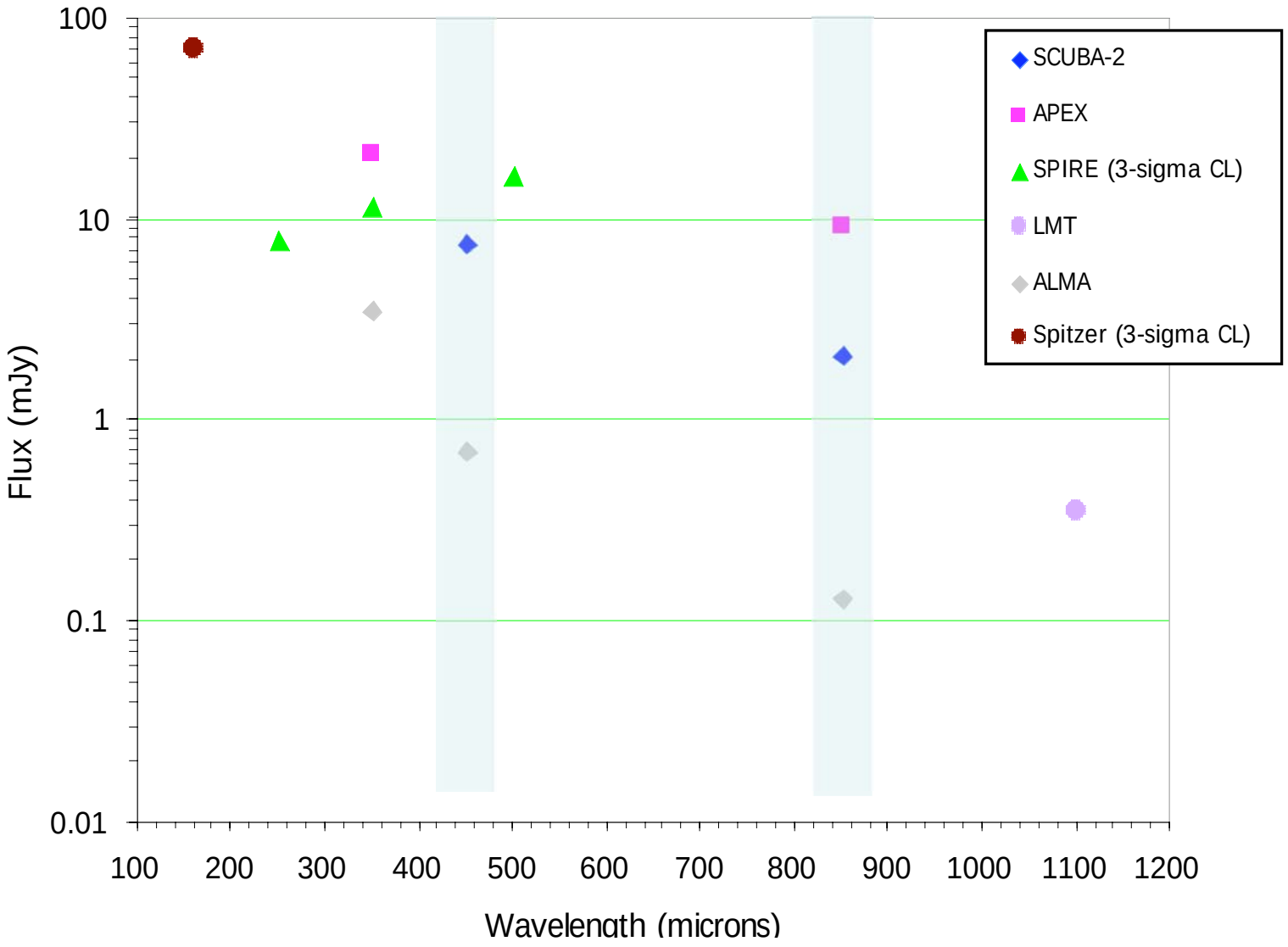
Performance comparison

Instrument	Wavelength (microns)	F-o-V (sq-arcmins)	NEFD (mJy)	FWHM (arcsec)	Confusion (mJy)
ALMA*	450	0.0069	8	0.2	0.0002
	850	0.022	1.5	0.4	0.0004
CCAT	200	25	150	2	0.04
	350	25	14	3.5	0.07
	450	25	13	4.5	0.1
	850[1]	100	6	8.5	0.2

*Compact ALMA configuration
[1]Slightly undersampled

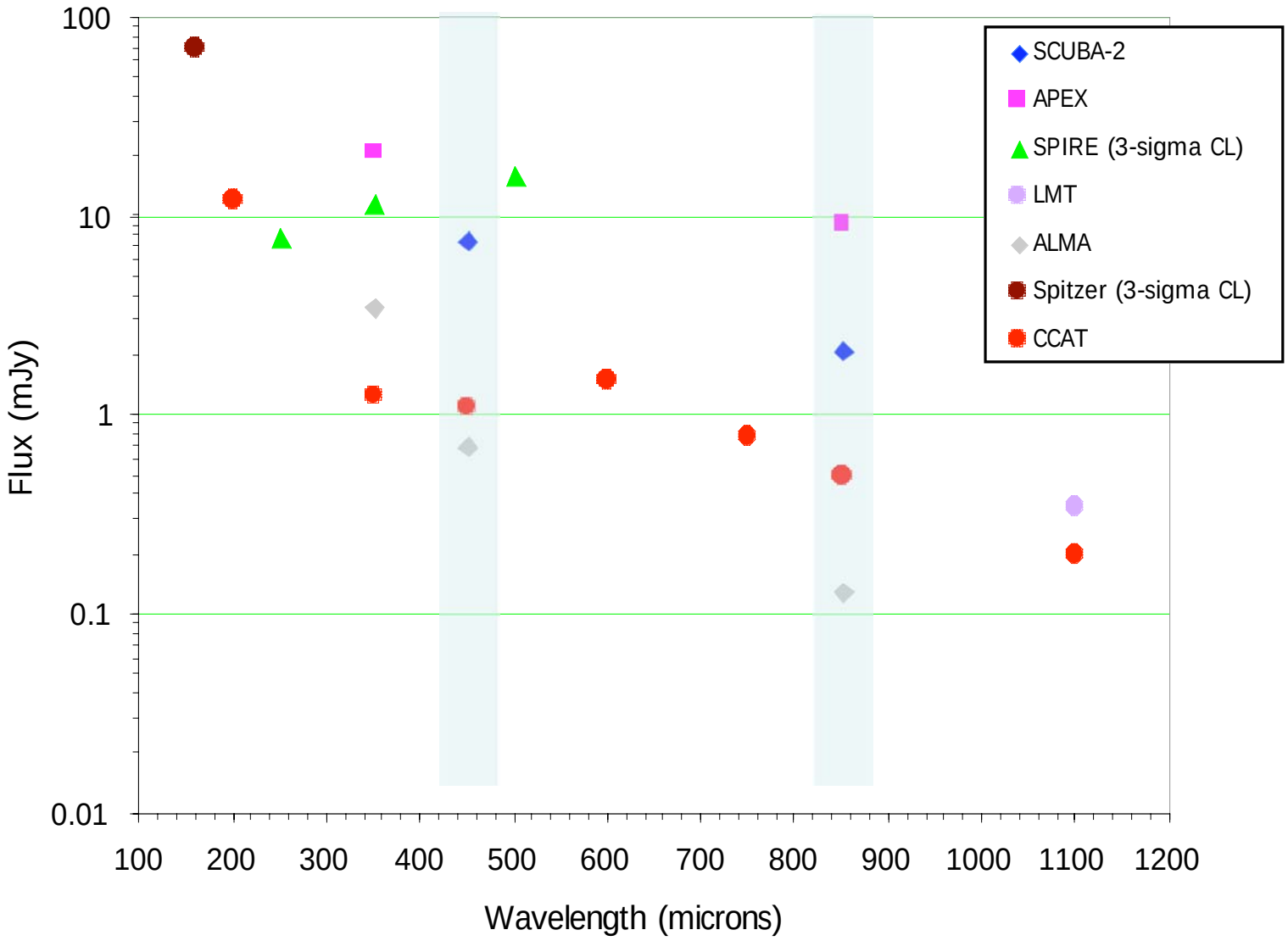
The confusion level in this case is simply scaled by aperture area/wavelength from the (measured) SCUBA 850μm 1-σ level

CCAT sensitivity



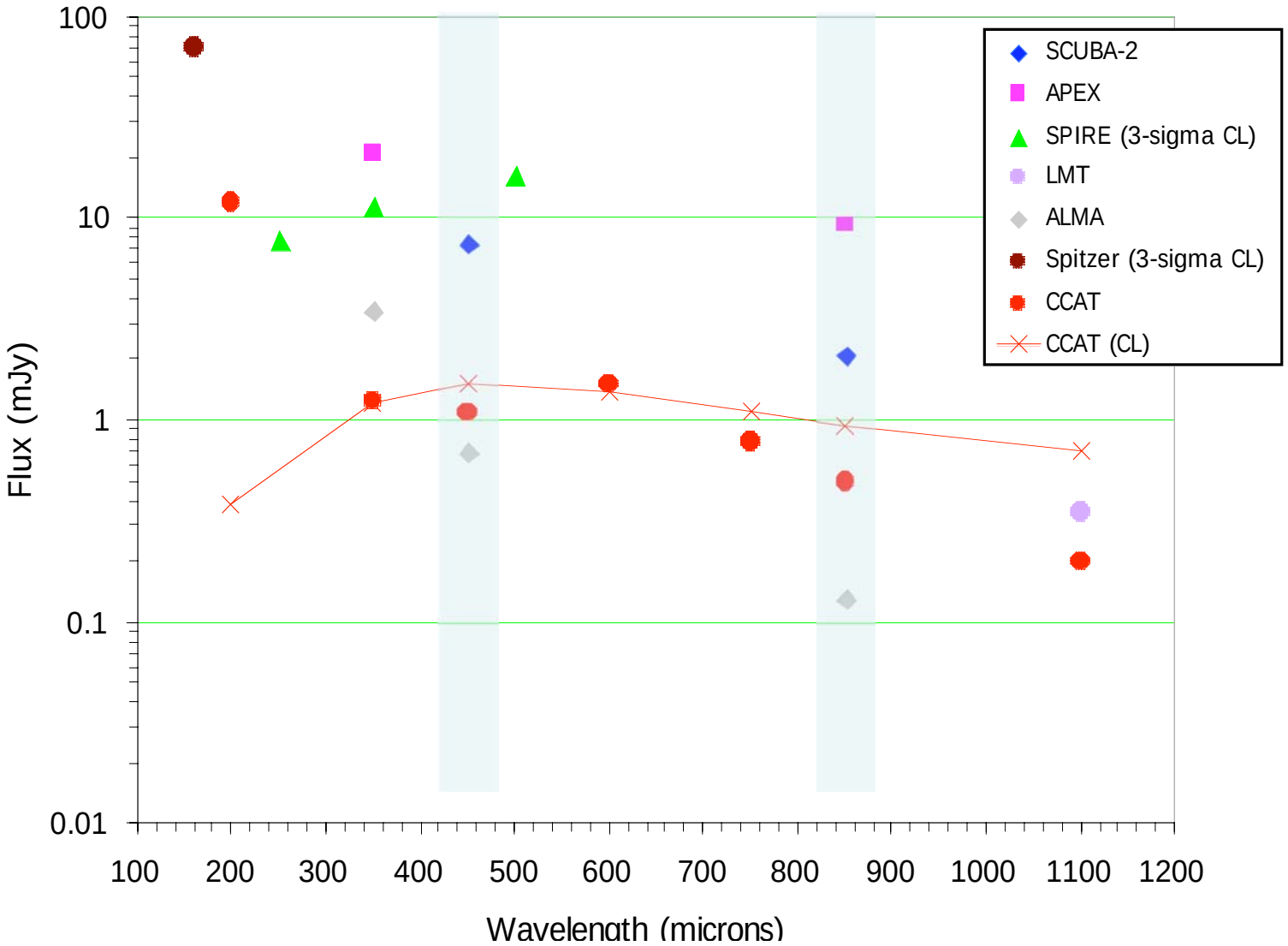
5σ, 1-hour sensitivities for various instruments

CCAT sensitivity



5σ, 1-hour sensitivities for various instruments

CCAT sensitivity



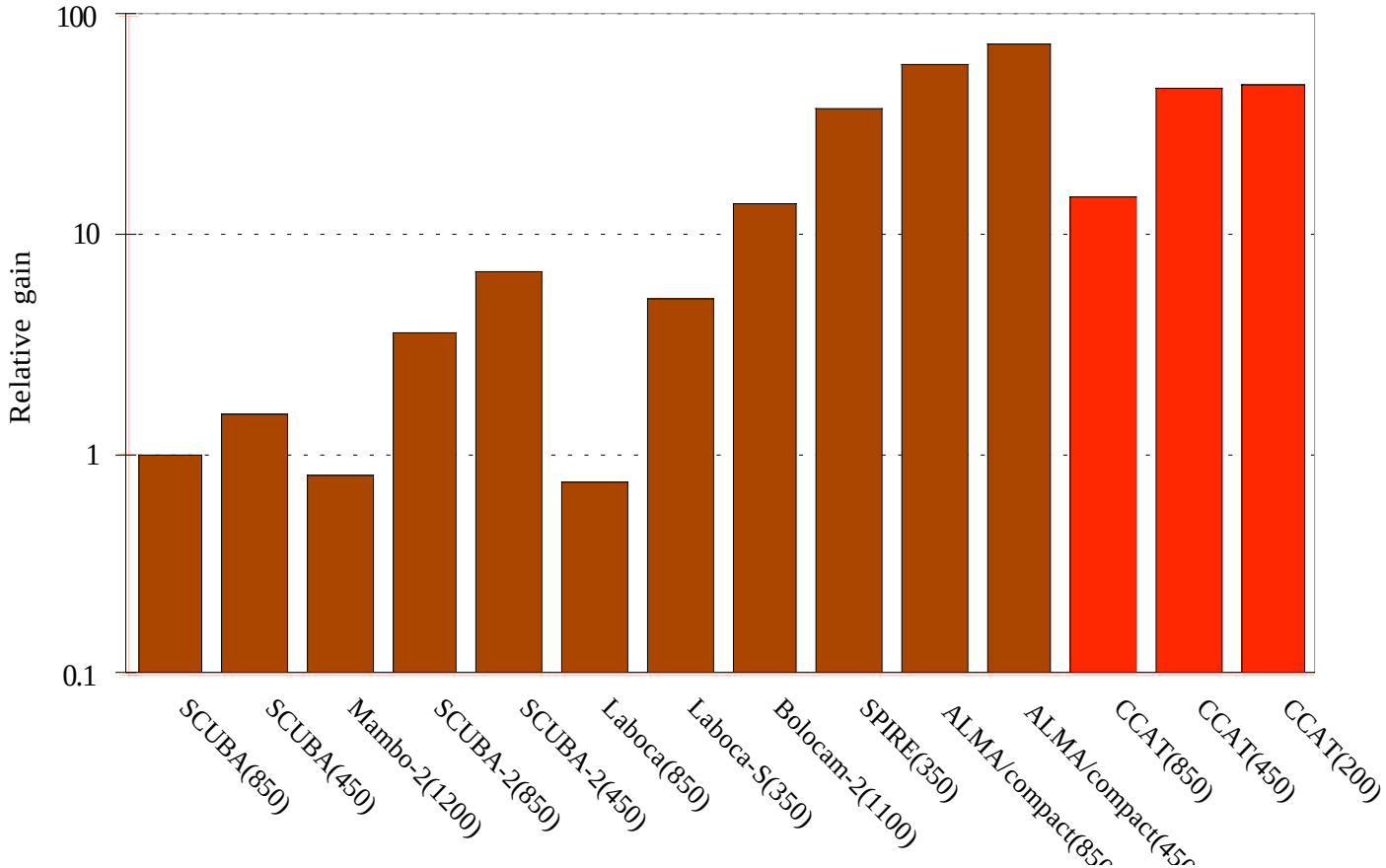
Confusion limit is 1 source per 30 beams and is calculated assuming CL is proportional to $D^{-\alpha}$ where $\alpha=2$ at 350μm and 1.2 at 850μm

Dust Mass Sensitivity

Dust at >30K and objects z<2 emission has a spectral index slope of ~2+β

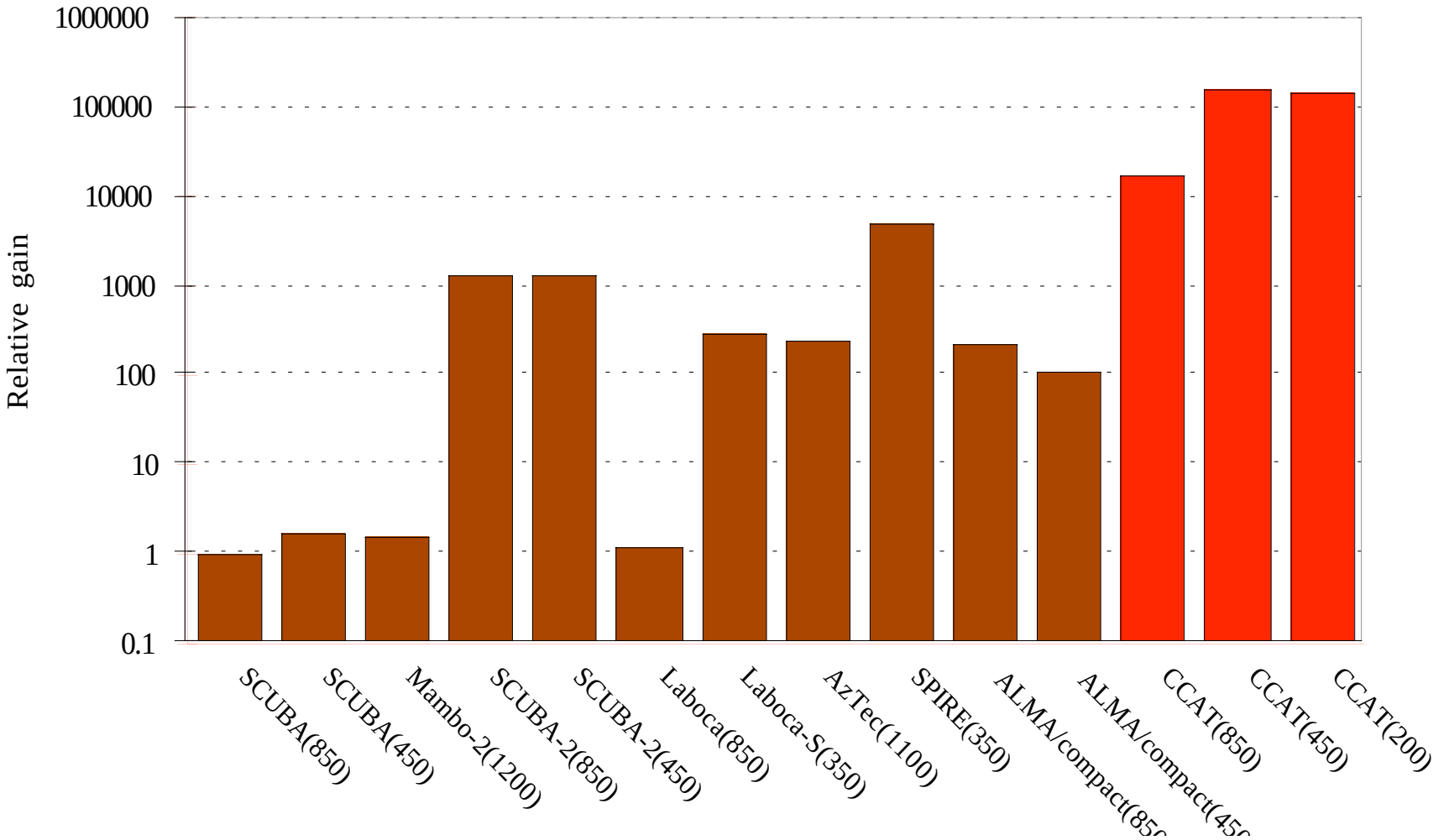
β=0 for a pure black-body, whilst β=2 for small ISM grains

Taking β=1 compute the relative gain of CCAT for a given mass of dust compared with other instruments



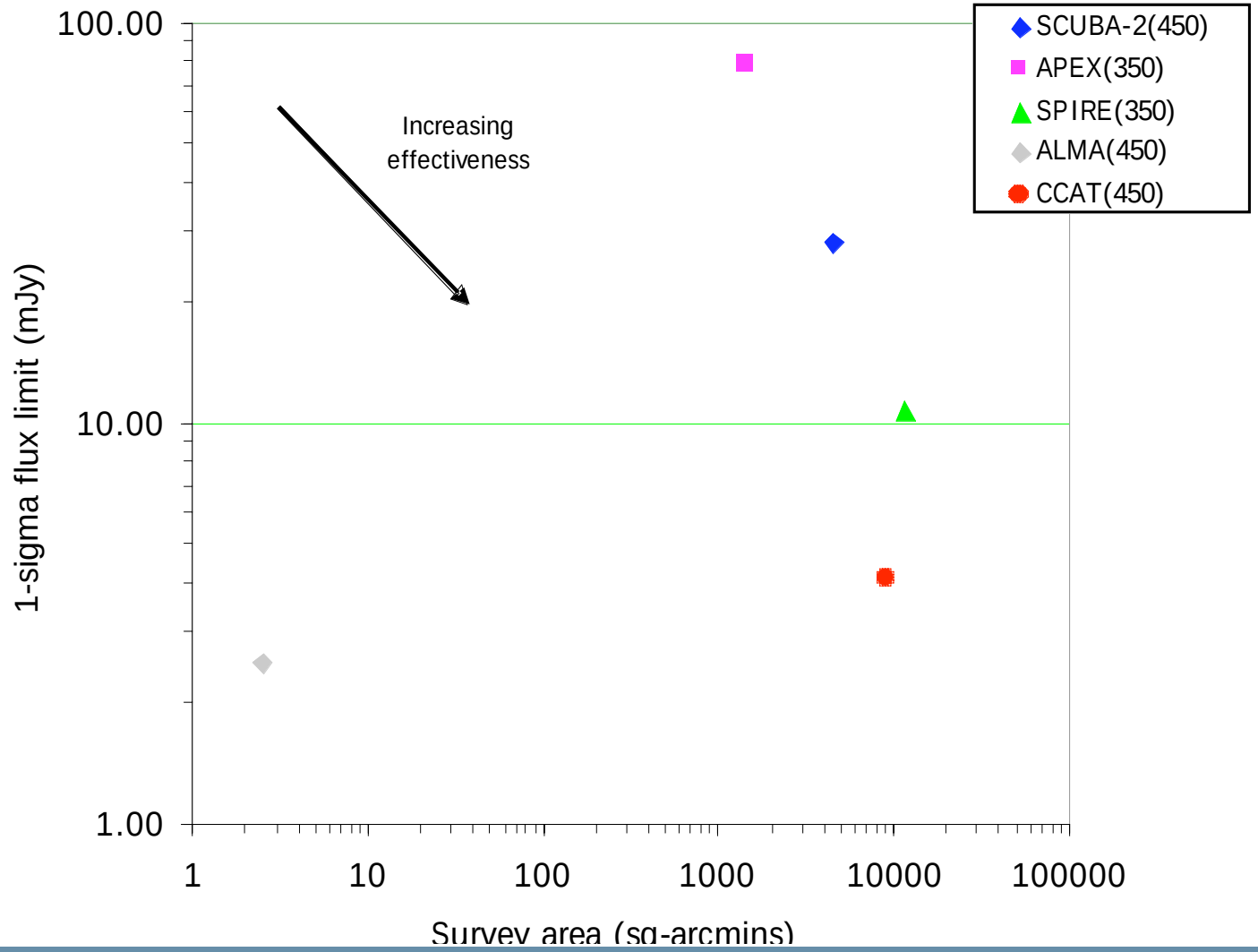
Relative to SCUBA at 850μm

Mapping Speed



Large area mapping speeds assuming the same dust mass sensitivity (relative to SCUBA 850)

Field Mapping



Flux limit versus area mapped assuming 10sec/pointing (no overheads)

Angular Resolution