Channel [GHz]	Beam [arcmin]	$N_{\rm det}$	ΔT [μK.arcmin]	ΔP [μK.arcmin]	ΔI [$\mu K_{\rm RJ}$.arcmin]	ΔI [kJy/sr.arcmin]	$\Delta y \times 10^6$ [$y_{\rm SZ}$.arcmin]	PS ($5\,\sigma$) [mJy]
60	17.87	48	7.5	10.6	6.81	0.75	−1.5	5.0
70	15.39	48	7.1	10.0	6.23	0.94	−1.5	5.4
80	13.52	48	6.8	9.6	5.76	1.13	−1.5	5.7
90	12.08	78	5.1	7.3	4.19	1.04	−1.2	4.7
100	10.92	78	5.0	7.1	3.90	1.20	−1.2	4.9
115	9.56	76	5.0	7.0	3.58	1.45	−1.3	5.2
130	8.51	124	3.9	5.5	2.55	1.32	−1.2	4.2
145	7.68	144	3.6	5.1	2.16	1.39	−1.3	4.0
160	7.01	144	3.7	5.2	1.98	1.55	−1.6	4.1
175	6.45	160	3.6	5.1	1.72	1.62	−2.1	3.9
195	5.84	192	3.5	4.9	1.41	1.65	−3.8	3.6
220	5.23	192	3.8	5.4	1.24	1.85	...	3.6
255	4.57	128	5.6	7.9	1.30	2.59	3.5	4.4
295	3.99	128	7.4	10.5	1.12	3.01	2.2	4.5
340	3.49	128	11.1	15.7	1.01	3.57	2.0	4.7
390	3.06	96	22.0	31.1	1.08	5.05	2.8	5.8
450	2.65	96	45.9	64.9	1.04	6.48	4.3	6.5
520	2.29	96	116.6	164.8	1.03	8.56	8.3	7.4
600	1.98	96	358.3	506.7	1.03	11.4	20.0	8.5
Array		2100	1.2	1.7			0.41	

Table 1. Proposed *CORE* frequency channels. The sensitivity is calculated for a 4-year mission, assuming $\Delta\nu/\nu = 30\%$ bandwidth, 60% optical efficiency, total noise of twice the expected photon noise from the sky and the optics of the instrument being cooled to 40 K. This configuration has 2100 detectors, about 45% of which are located in CMB channels between 130 and 220 GHz. Those six CMB channels yield an aggregate CMB sensitivity in polarisation of $2\,\mu$K.arcmin ($1.7\,\mu$K.arcmin for the full array).

channels ranging from 255 to 600 GHz serve to monitor dust emission, and to map cosmic infrared background (CIB) anisotropies that can serve as a tracer of mass for "de-lensing" CMB polarisation B modes (25). The telescope size (1.2-m aperture) is such that the angular resolution is better than $18'$ over the whole frequency range, so that all the frequency channels can be used for component separation down to this angular resolution. In the cleanest regions of the sky, the CMB will be mapped in eight frequency channels or more, with an angular resolution ranging from $\simeq 5'$ to $10'$ and a sensitivity to polarisation in the 5–8 μK.arcmin range for each channel independently.

The geometry of the spacecraft, displayed in figure 2, is as symmetric as possible to avoid any thermal effect due to the modulation of the solar flux on the spacecraft while it spins to scan the sky. The main elements of the payload module (PLM), telescope, screens and baffles, will be kept cold by passive cooling, to minimise the requirements on the active cryogenic chain. Passive cooling of the PLM to approximately 40 K will be achieved by keeping the payload in the shadow of the service module (SVM), and thermally decoupling the PLM from the SVM with a set of highly reflective V-grooves (a conceptual design similar to that succesfully used on *Planck*, 26), while the main payload conical screen radiates towards free space to compensate for conductive heat inflow from the SVM.

Although the design and performance of the instrument do not critically depend on the payload temperature actually achieved (which could be as high as 90 K or more with acceptable impact on the mission performance), the low payload temperature that is achieved by passive cooling also reduces the background on the detectors, resulting in better sensitivity overall, in particular in the frequency channels above 220 GHz.

CORE will be in orbit around the second Sun-Earth Lagrange point (L2), and will scan the sky with a dedicated scanning strategy combining a fast spin ($T_{\rm spin} \simeq 2$ minutes) around the spacecraft principal axis of symmetry, a slower precession ($T_{\rm prec} \simeq 4$ days) around an axis