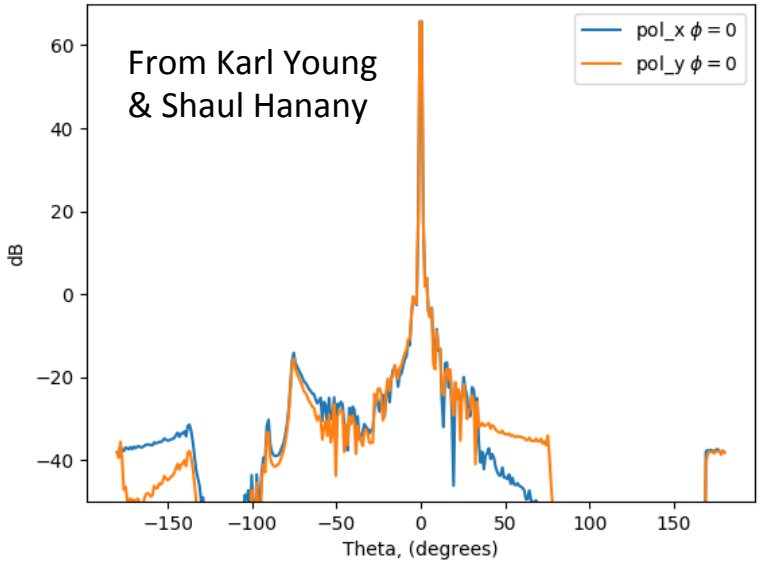
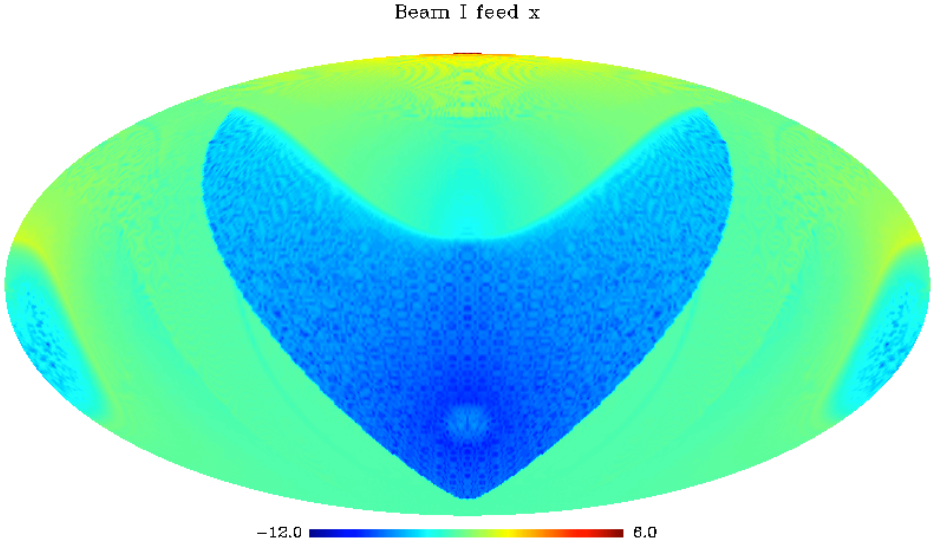
Sidelobes and baffling for PICO

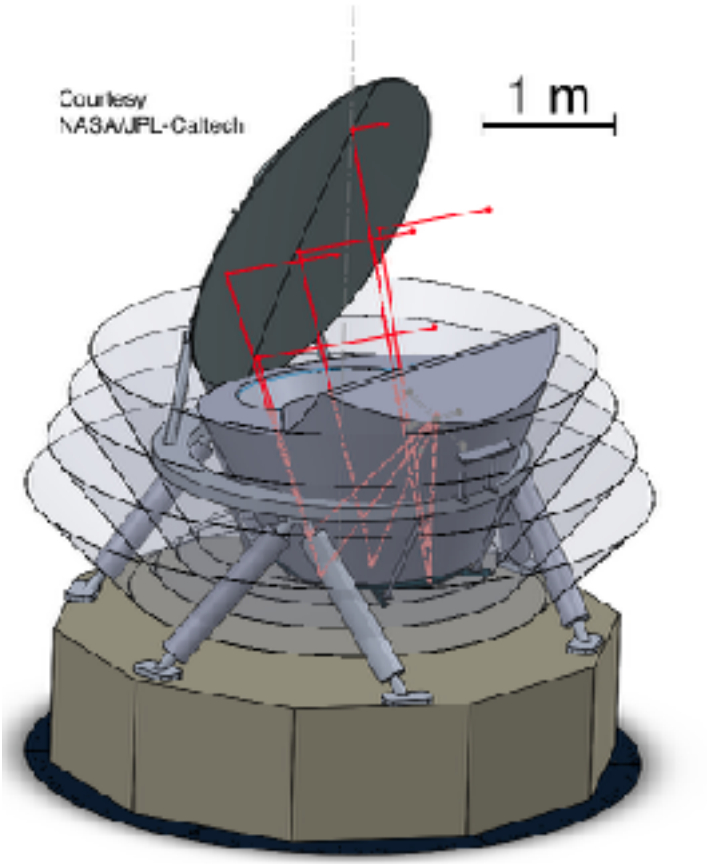
Jacques Delabrouille
APC, Paris and CEA/DAp, Saclay

With contributions from
Karl Young, Shaul Hanany, Brendan Crill, Kris Gorski

Antenna pattern at 150 GHz







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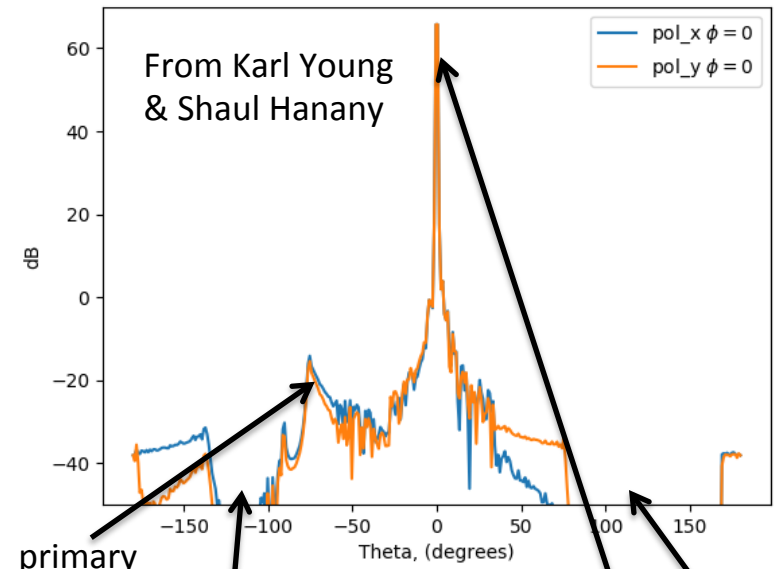

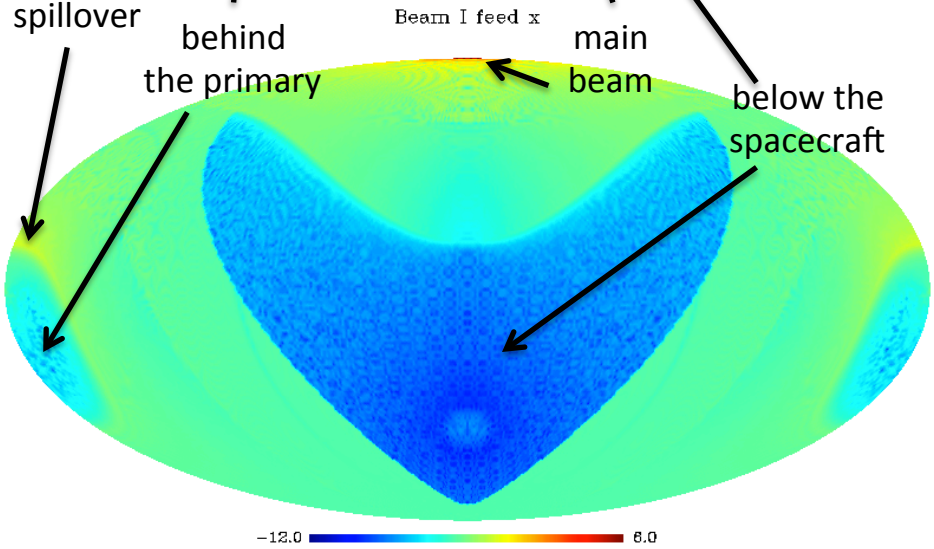

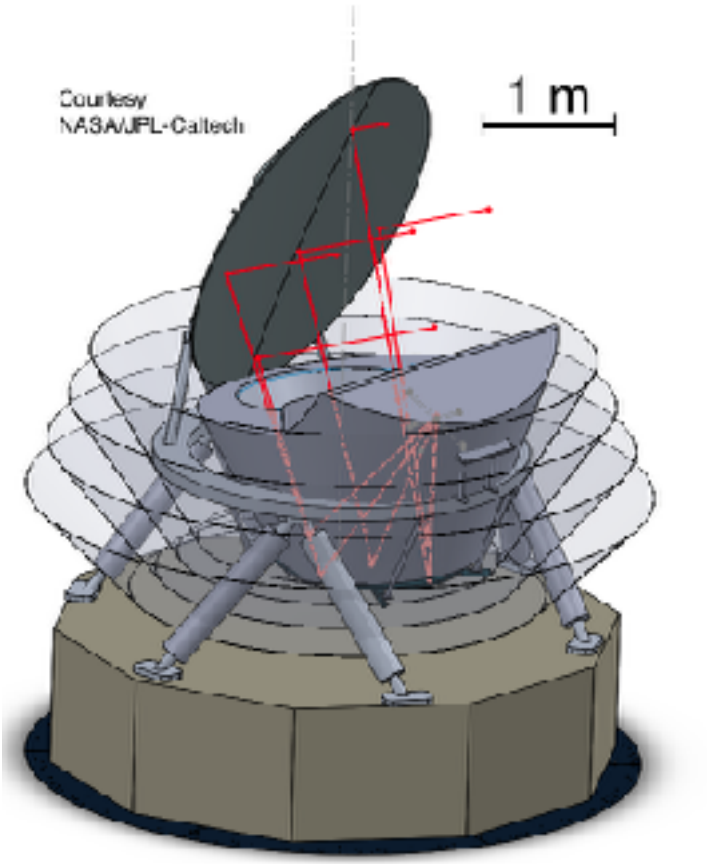

Rough estimate of the effect

- Main sources of sidelobe straylight: Sun, Earth, Moon, galactic plane, CMB dipole

source	T_{RJ}	solid angle (sr)	emission (K_{RJ}.sr)	Rejection
Sun	6000 K	6.7×10^{-5}	4.0×10^{-1}	100-120 dB
Earth	290 K	5.7×10^{-5}	1.6×10^{-2}	85-105 dB
Moon	250 K	$2.6 - 7.3 \times 10^{-6}$	$6.4 - 18 \times 10^{-4}$	70-95 dB
Galactic ridge	1 mK	5.7×10^{-2}	5.7×10^{-5}	60-80 dB
Dipole	3.5 mK	$\sim 2\pi$	$\sim 2 \times 10^{-2}$	
1 μK.arcmin at 10′ scale	0.1 μK	6.6×10^{-6}	6.6×10^{-13}	
1 μK.arcmin at 100′ scale	0.01 μK	6.6×10^{-4}	6.6×10^{-12}	
1 μK.arcmin at 1000′ scale	0.001 μK	6.6×10^{-2}	6.6×10^{-11}	

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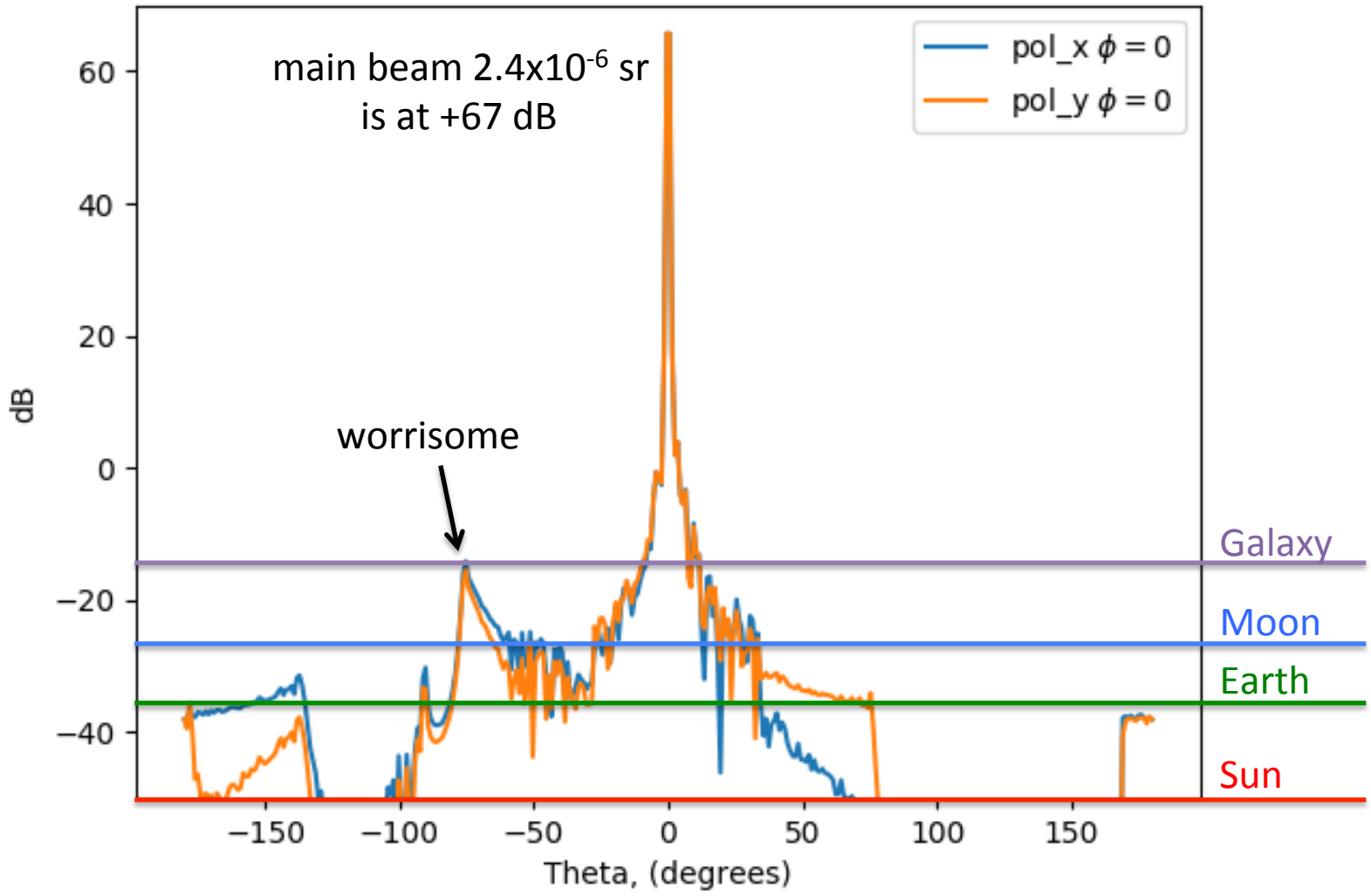


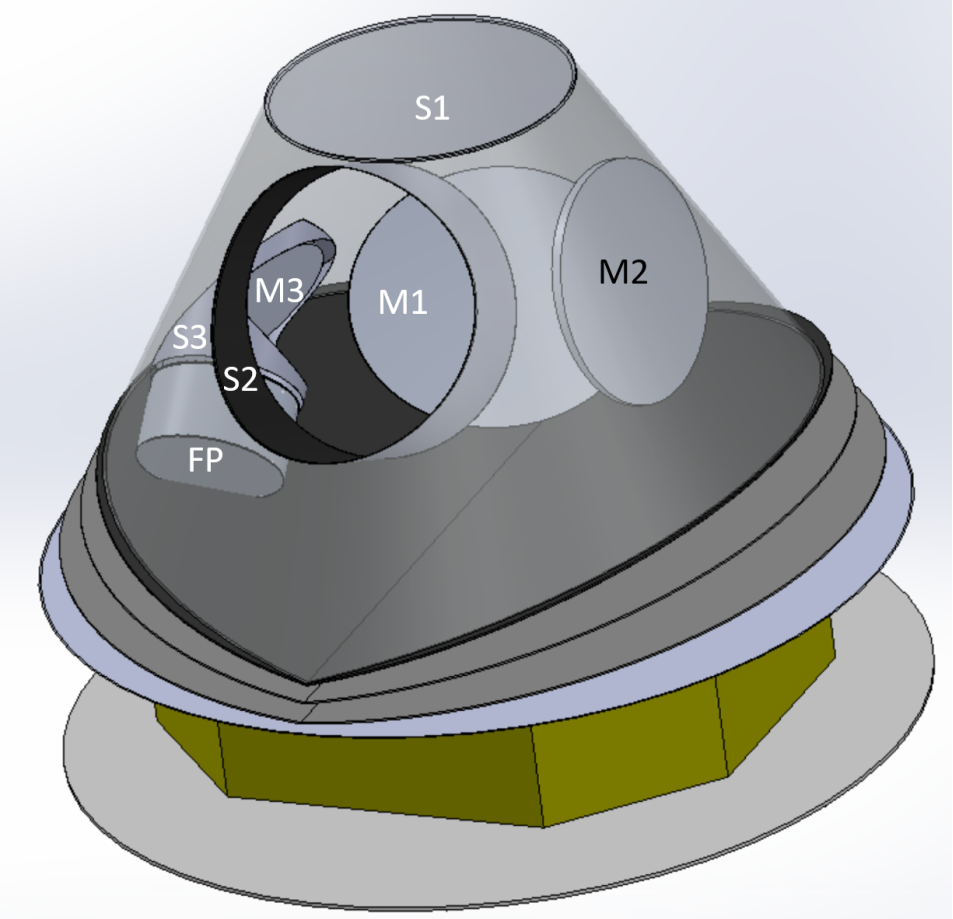
CORE shielding solution

A set of shields prevents unwanted radiation to reach the detectors

Inside is black at CMB frequencies

Each "bounce" absorbs >90% radiation, providing an extra 10 dB rejection

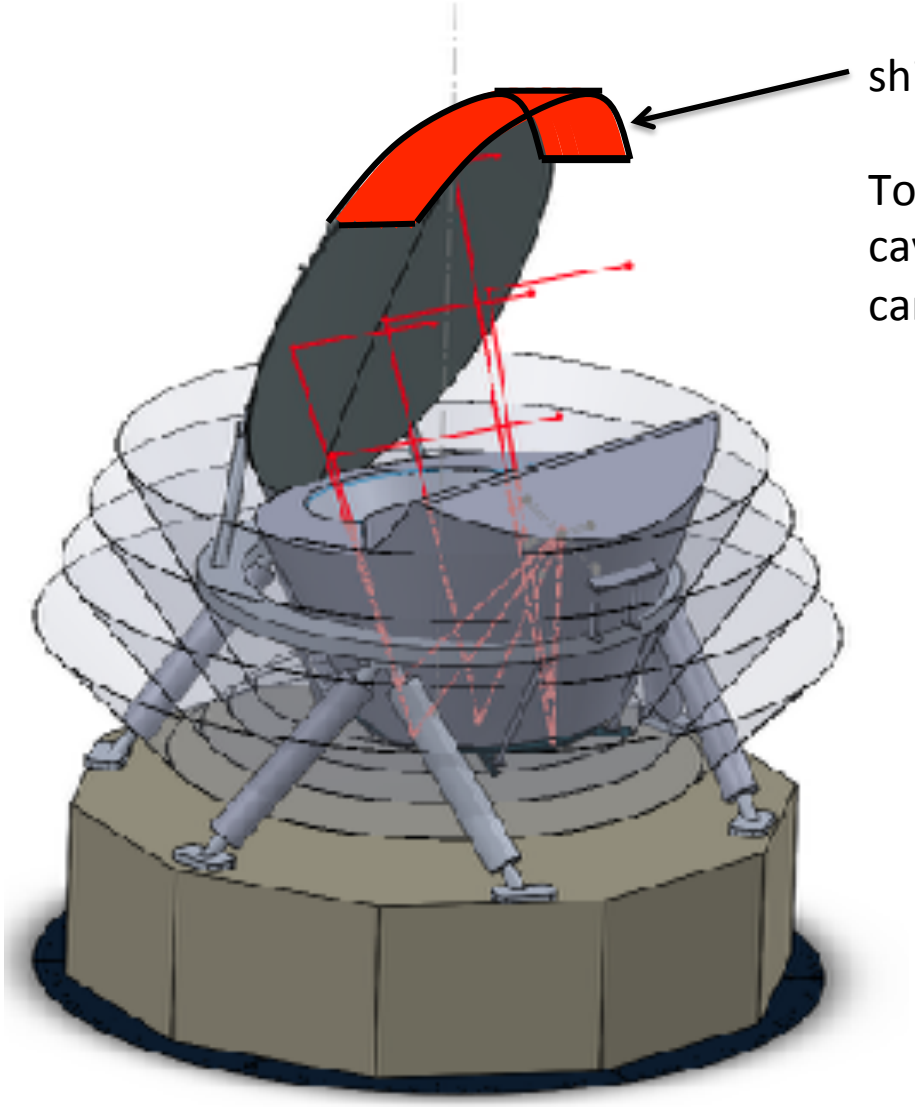
caveat: hard to model with GRASP!



V-grooves provide passive cooling of the payload to 40K

(Planck heritage)

Option for PICO



shield to stop spillover ?

To be studied.
caveat: the Sun
cannot shine on it!