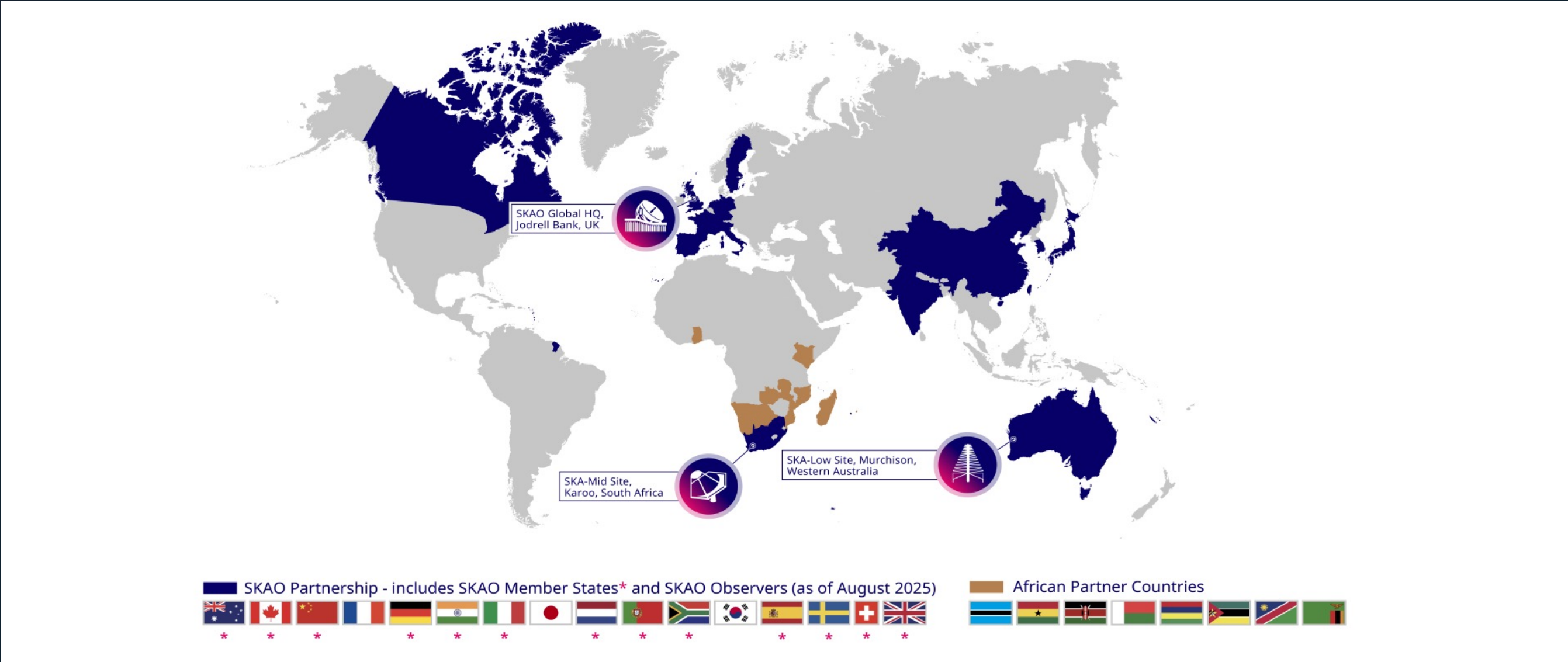


Radio Astronomy: From MeerKAT to the SKA

Square Kilometre Array (SKA): The largest radio interferometer of the coming decade, currently being constructed in South Africa (SKA-Mid) and Australia (SKA-Low).

FERDINAND JÜNEMANN, ARITRA BASU, FELIX JANKOWSKY AND STEFAN WAGNER

Overview



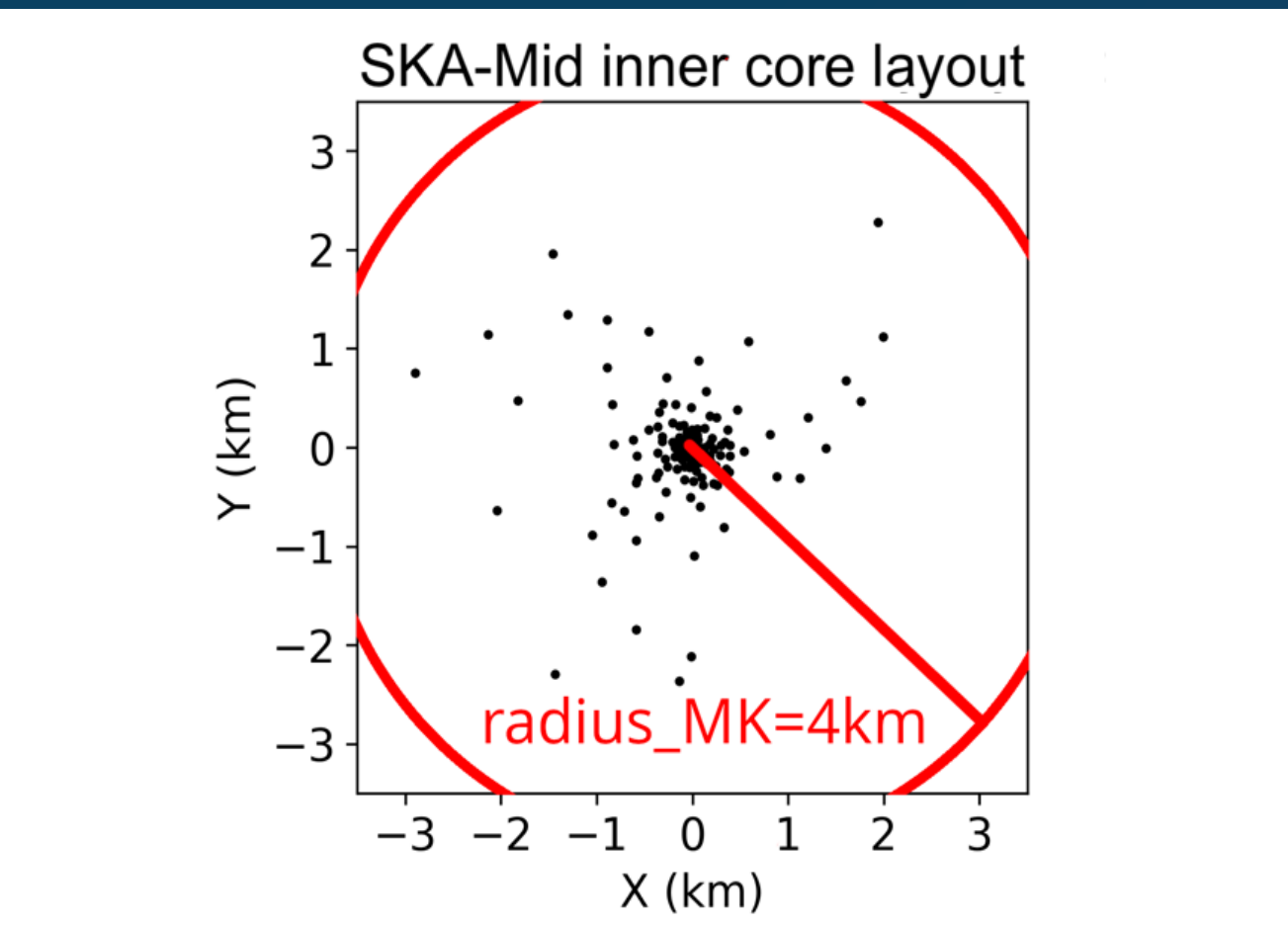
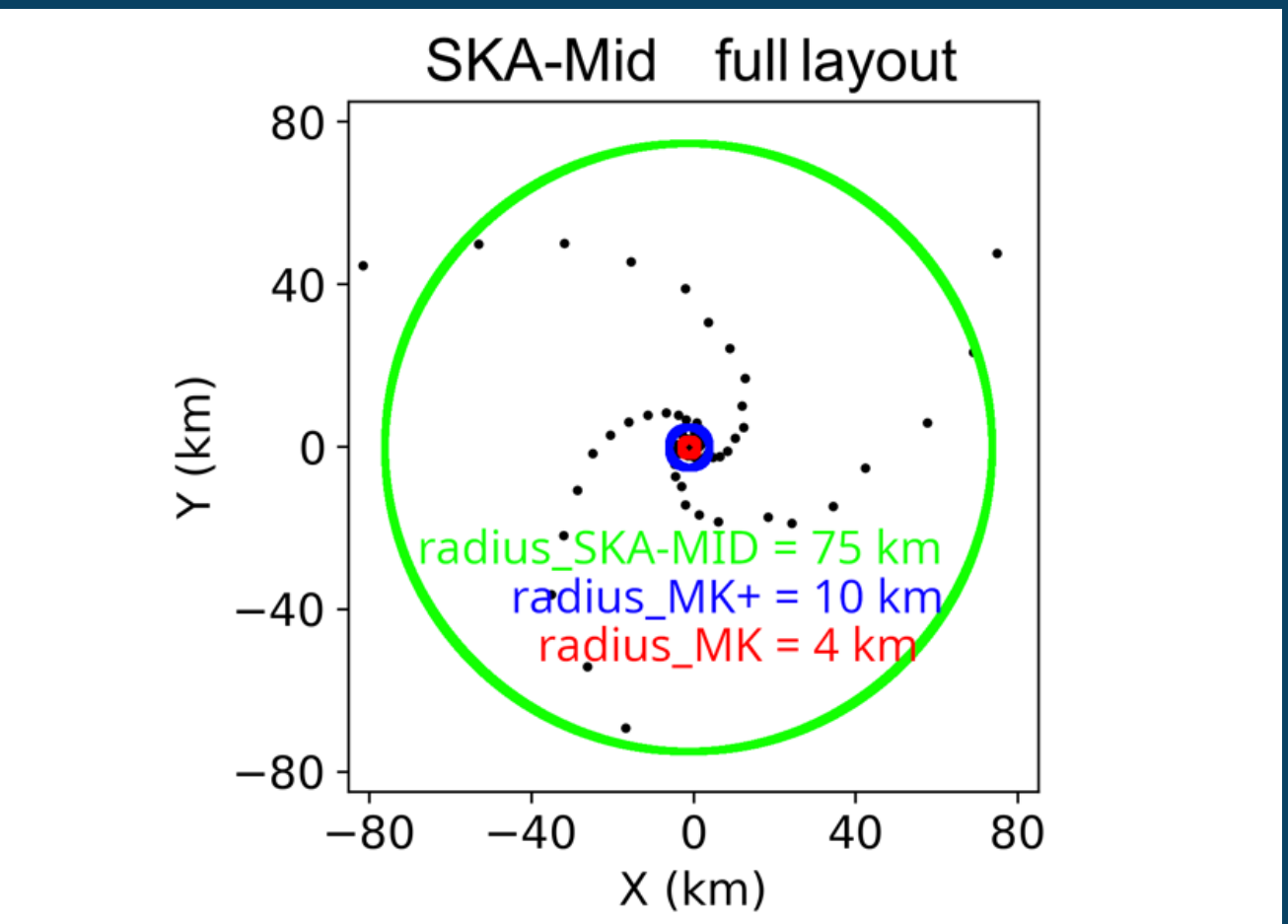
The SKAO partner countries and sites



An animation of the MeerKAT Expansion (left) and MeerKAT (center) telescopes and the SKA-Low antennas (right)

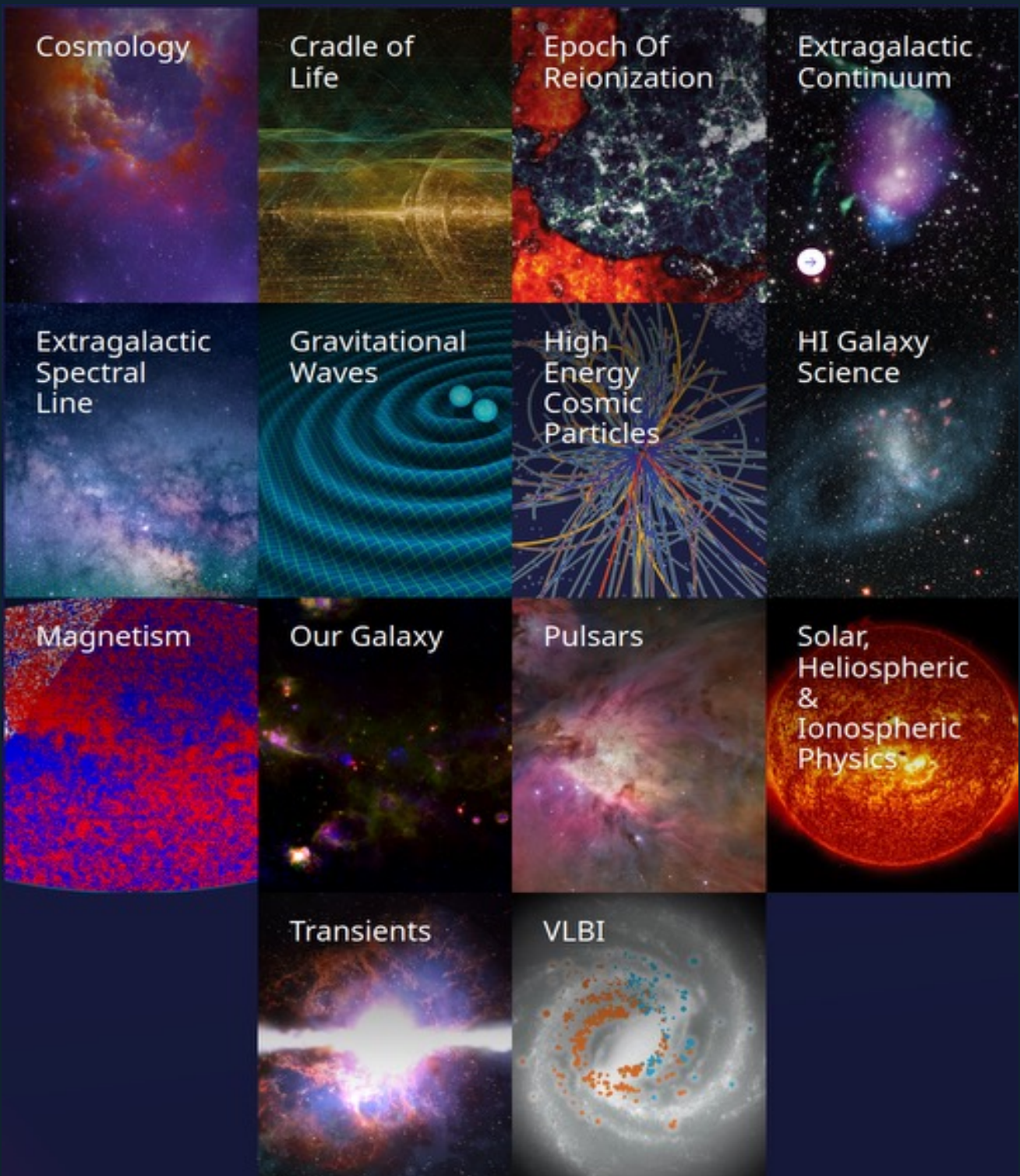
SKA-Mid Phases

Key Parameter	MeerKAT	MeerKAT+	SKA-Mid
First light	2016	2027	2031 est.
Number N & Diameter of dishes	64 * 13.5 m	64 * 13.5 m + 14 * 15.3 m	64 * 13.5 m + 133 * 15.3 m
Collecting Area	9000 m ²	12000 m ²	33000 m ²
Longest Baseline D	8 km	20 km	150 km
Shortest Baseline		29 m	
Sensitivity (L-Band, 1 h integration, 875 MHz bandwidth)	2.7 μ Jy	2.1 μ Jy	0.7 μ Jy
Resolution at 2 GHz (λ/D)	3.9 arcsec	1.5 arcsec	0.2 arcsec
Frequency Windows	UHF (0.5-1.015 GHz) L (0.9-1.67 GHz) S (1.75 - 3.5 GHz)		0.35 – 15.4 GHz

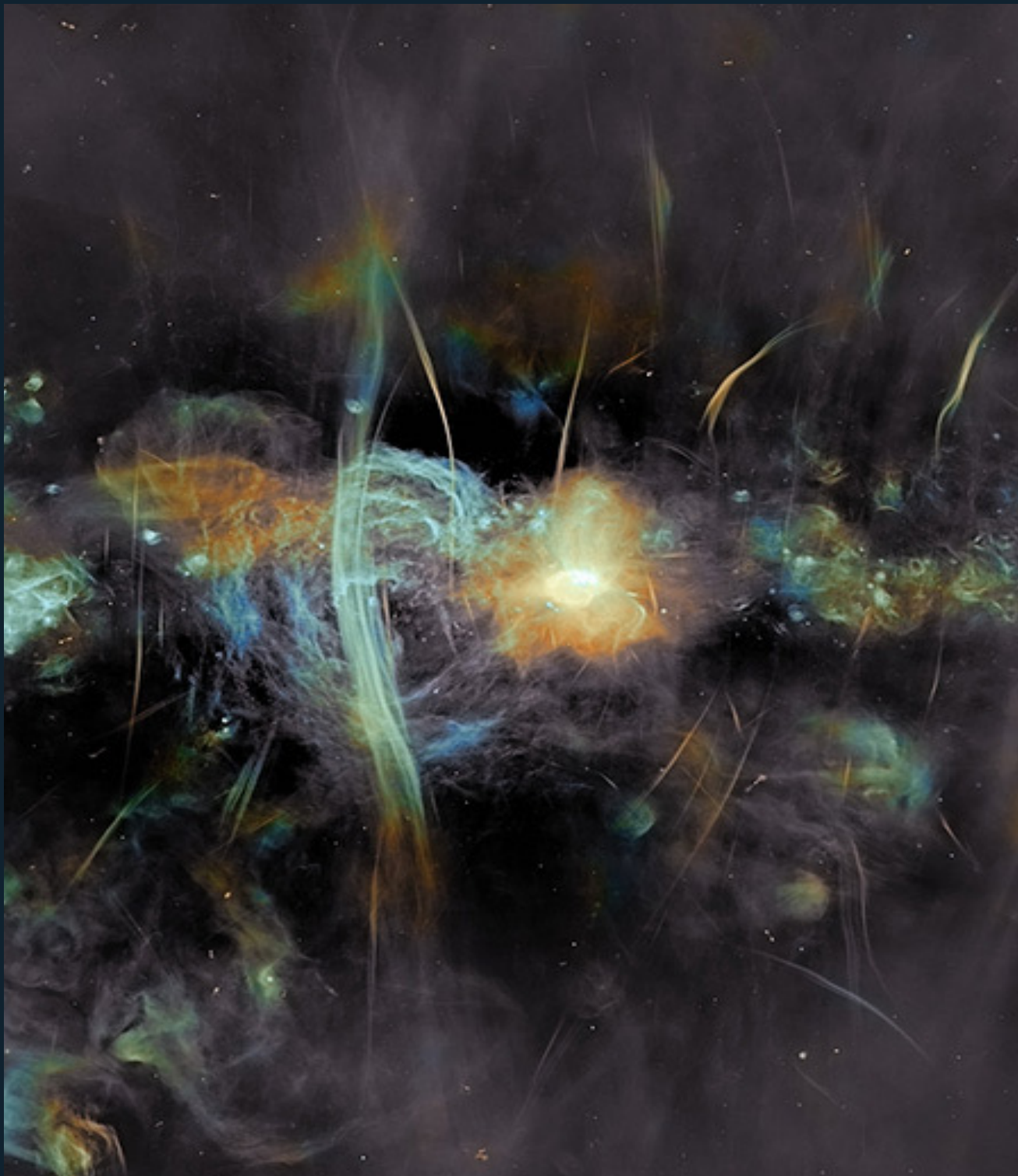


MeerKAT is the first phase of SKA-Mid. It will become part of the inner core. It is currently being expanded through the MeerKAT extension (MK+) lead by the Max-Planck Institute for Radio Astronomy (MPIfR), Bonn, and the South African Radio Astronomy Observatory (SARAO). The MK+ dishes will be incorporated at the inner side of the spiral arms of SKA-Mid.

SKA Science Program



Science working groups of the SKAO



Heywood et al. 2022

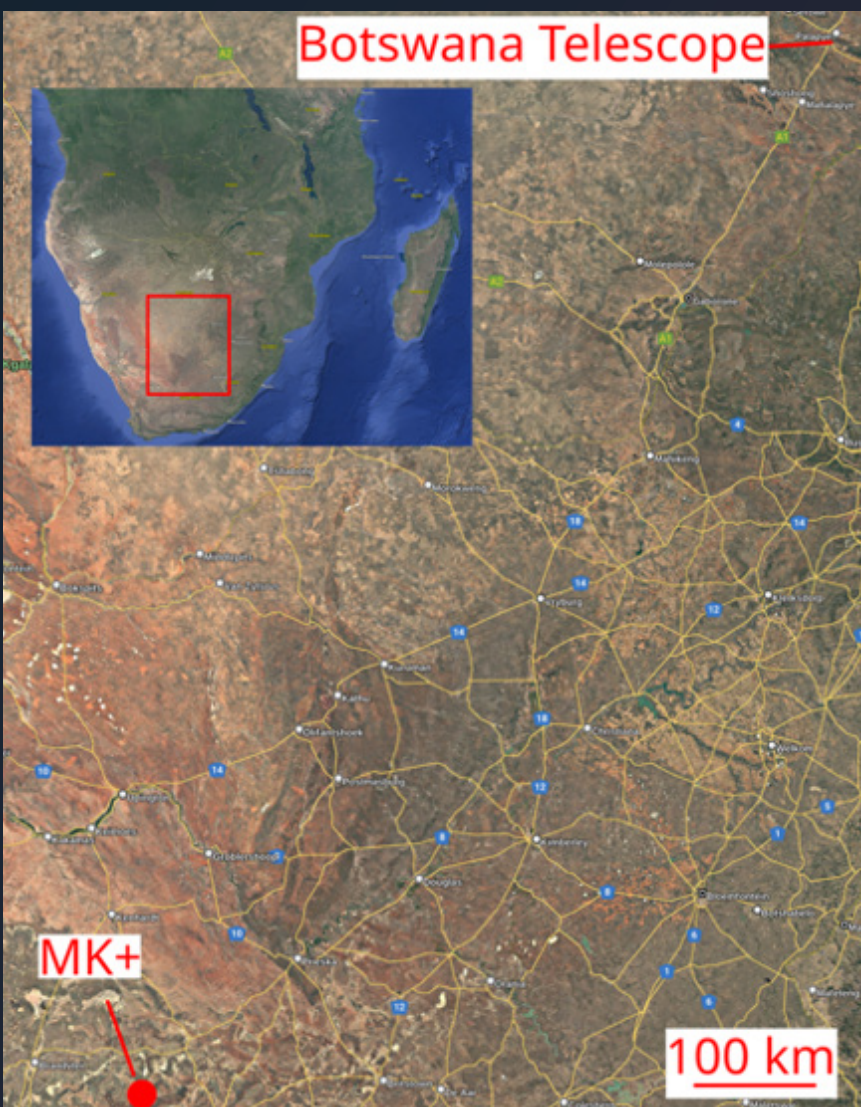
Thanks to its unprecedented performance, the SKA can advance almost all possible radio astronomy research. The combination of sensitivity and resolution is demonstrated by the spectral index image of the Galactic center created with MeerKAT.

The DZA contribution

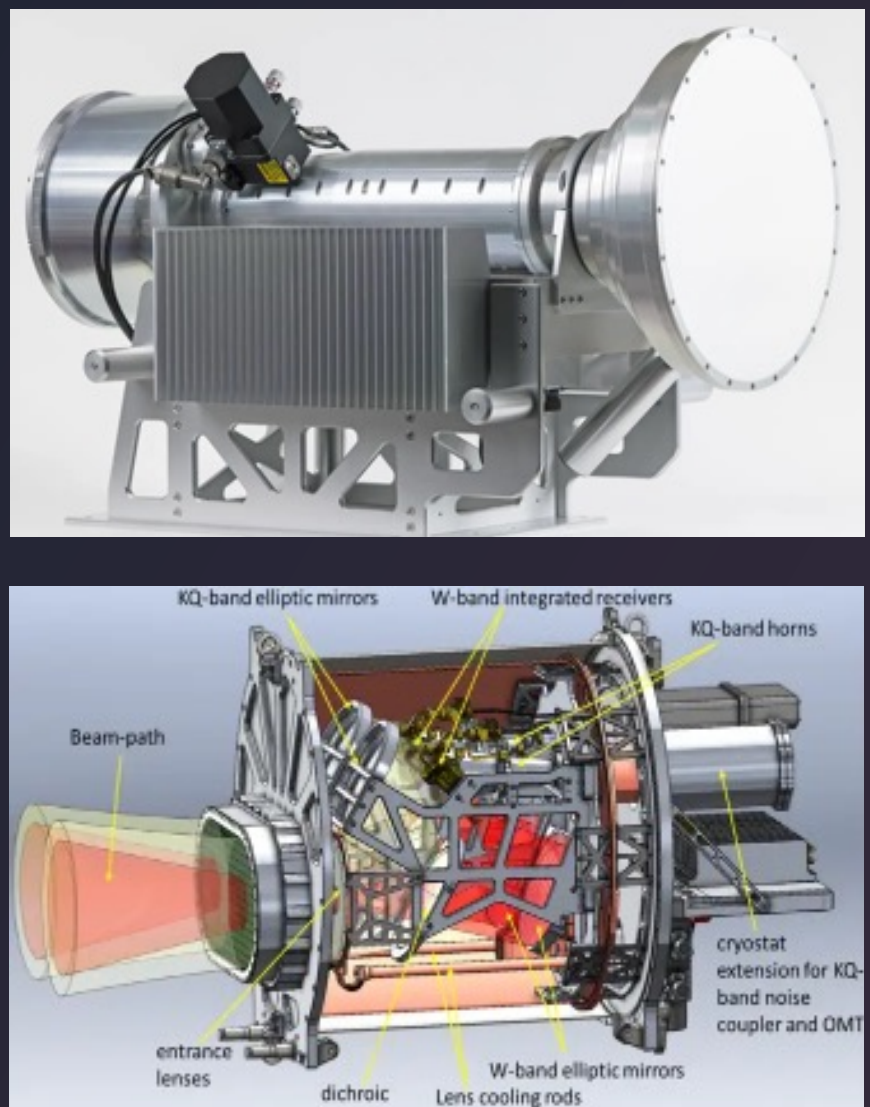
The DZA contributes two telescopes to MK+: one part of the SKA-Mid site, one at a very large baseline of 1000 km, increasing the resolution of MK+ by a factor of 50. This telescope in Botswana is the foundation for the African VLBI Network (AVN). The two telescopes will feature an additional CX-band receiver developed at the DZA in cooperation with the MPIfR. The DZA contribution secures the German community access to MK+.



The Botswana telescope will be structurally identical to the MK+ dishes



Baseline between the MK+ Site and the Botswana Telescope



Receiver development in cooperation with MPIfR