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SARAO  
South African Radio  
Astronomy Observatory



On Friday, 13 July 2012,  
the Deputy President of the  
Republic of South Africa  
Mr. Jacob Zuma  
officially inaugurated  
the construction  
of the MeerKAT,  
a 6-telescope radio telescope

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[www.ska.ac.za](http://www.ska.ac.za)

A MeerKAT radio telescope antenna on the SKA site at Losberg in the Karoo, in the Northern Cape province of South Africa. Credit: SARA0

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The South African Radio Astronomy Observatory (SARA0) spearheads South Africa's activities in the Square Kilometre Array Radio Telescope, commonly known as the SKA, in engineering, science and construction. SARA0 is a National Facility managed by the National Research Foundation and incorporates radio astronomy instruments and programmes such as the MeerKAT and KAT-7 telescopes in the Karoo, the Hartebeesthoek Radio Astronomy Observatory (HartRAO) in Gauteng, the African Very Long Baseline Interferometry (AVN) programme in nine African countries as well as the associated human capital development and commercialisation endeavours.



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MeerKAT First Light image. Each white dot represents the intensity of radio waves recorded with 16 dishes of the MeerKAT telescope in the Karoo (when completed, MeerKAT will consist of 64 dishes and associated systems). More than 1300 individual objects - galaxies in the distant universe - are seen in this image.

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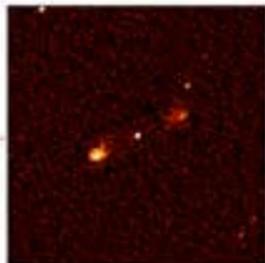
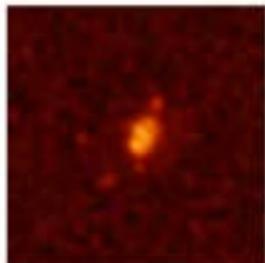
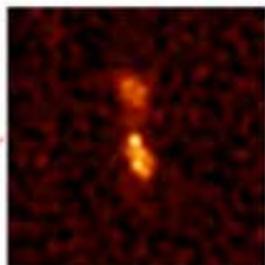
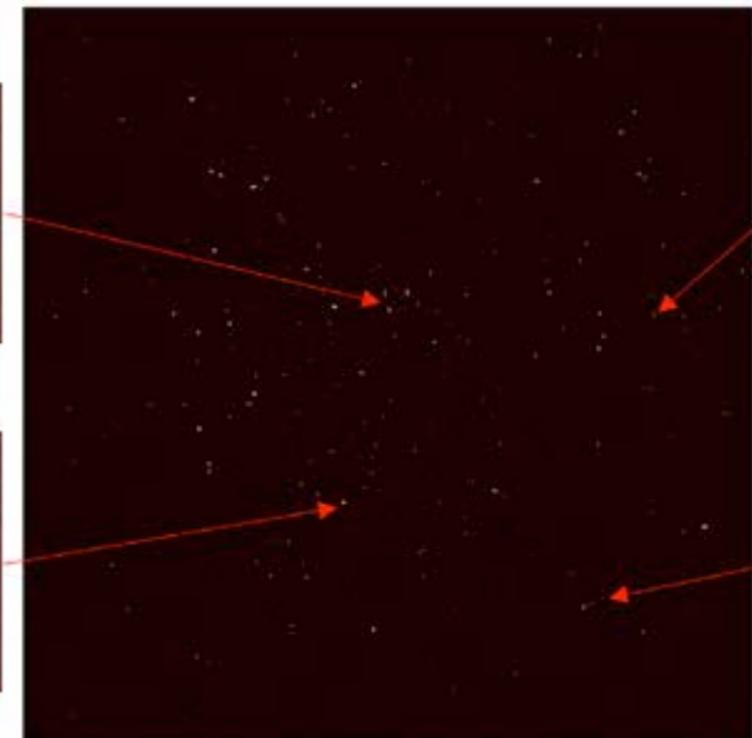
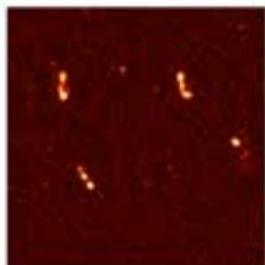
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Montage of MeerKAT First Light radio image and four zoomed-in insets. The two panels to the right show distant galaxies with massive black holes at their centers. At lower left is a galaxy approximately 200 million light years away, where hydrogen gas is being used up to form stars in large numbers.

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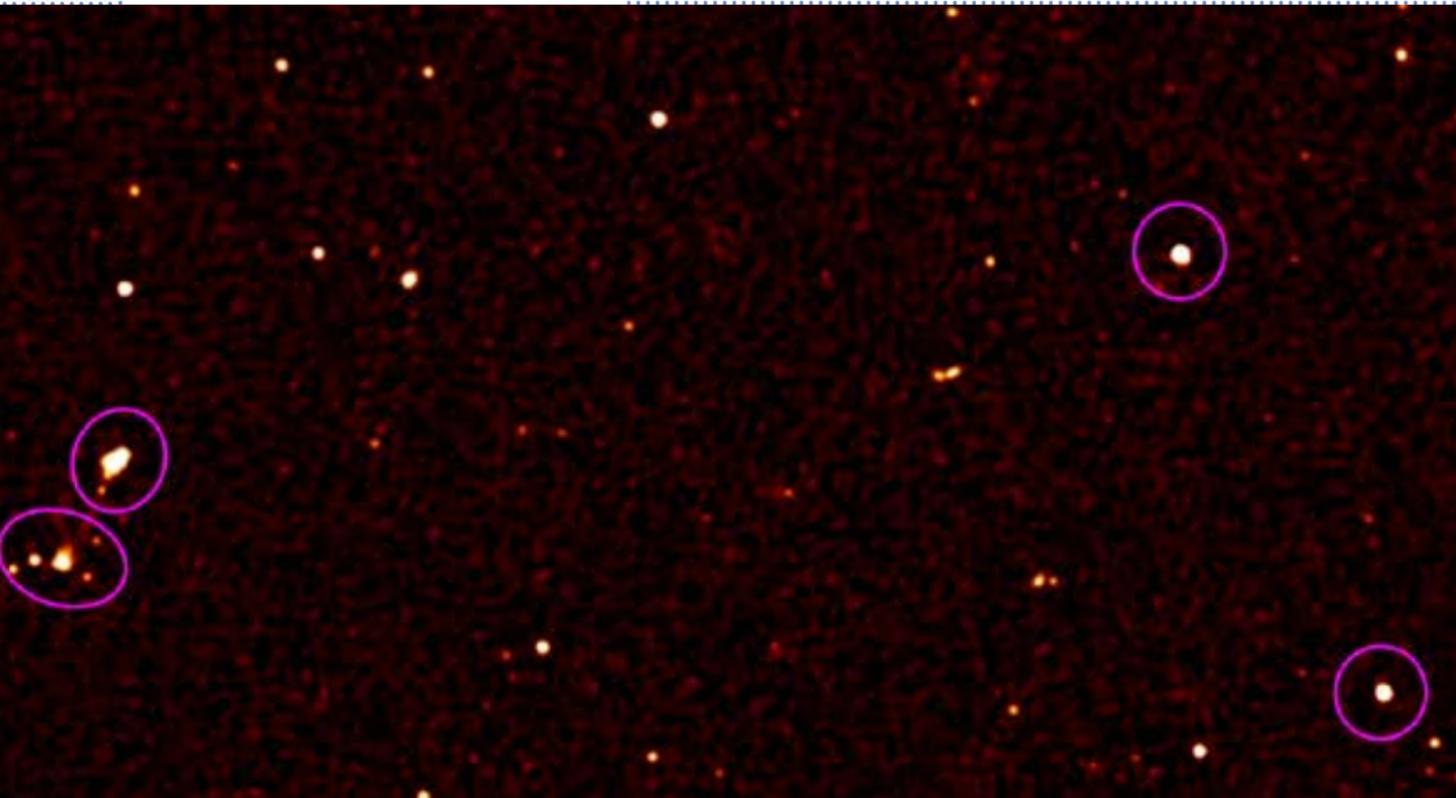


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View showing 10% of the full MeerKAT First Light radio image. More than 200 astronomical radio sources (white dots) are visible in this image, where prior to MeerKAT only five were known (indicated by violet circles). This image spans about the area of the Earth's moon.

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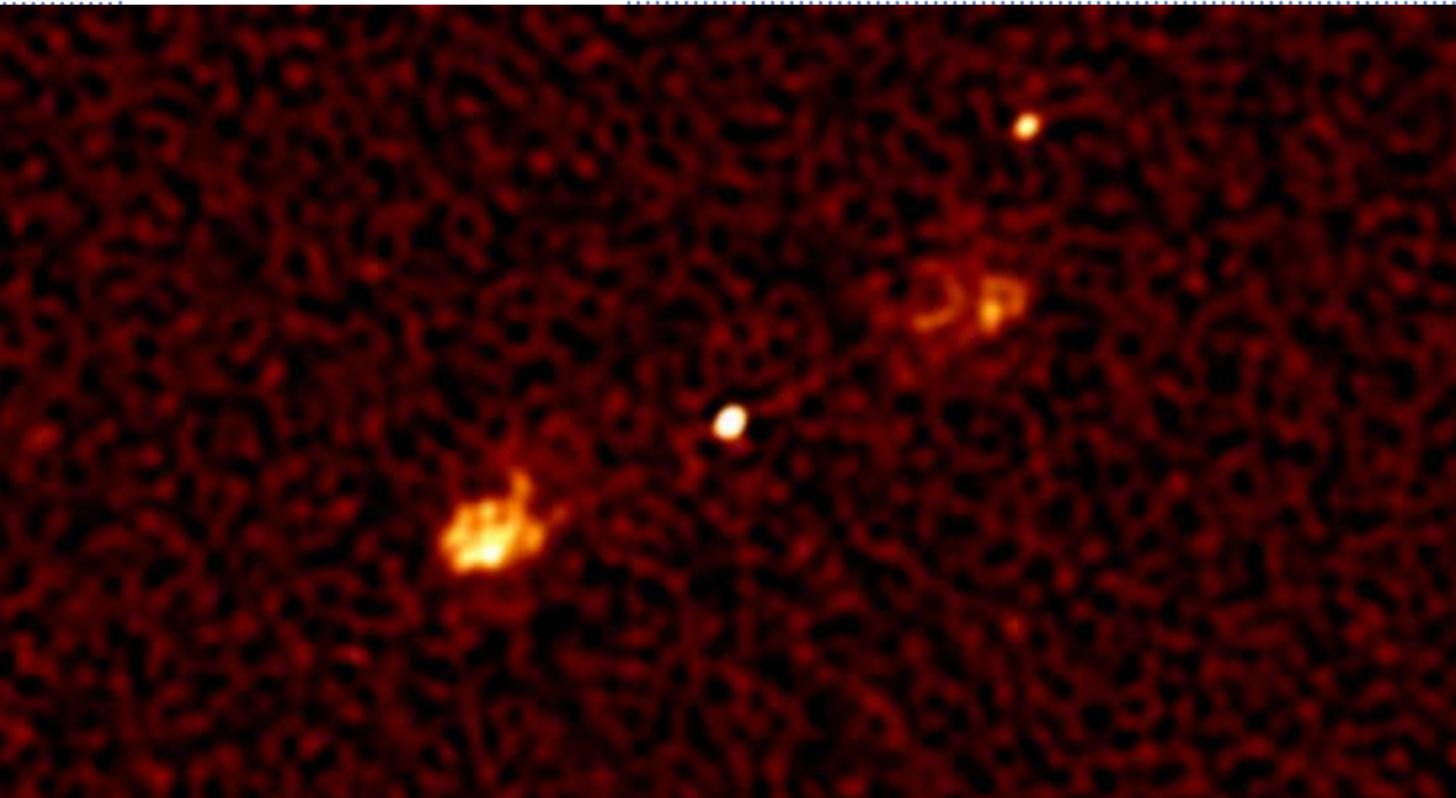


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This view, covering about 1% of the full MeerKAT First Light image, shows a “Faranoff-Riley Class 2” (FR2) object: a massive black hole in the distant universe (matter falling into it produces the bright dot at the center) launching jets of powerful electrons moving at close to the speed of light that emit radio waves detected with MeerKAT’s sharp view of the radio sky (thin lines connecting the central dot to the brighter lobes of radio emission).

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MeerKAT in the Northern Cape provides a magnificent view of the hydrogen gas in M83, a famous galaxy discovered in Cape Town in 1752. Credit: Optical data: Palomar Observatory Sky Survey, radio data: MeerKAT radio telescope.

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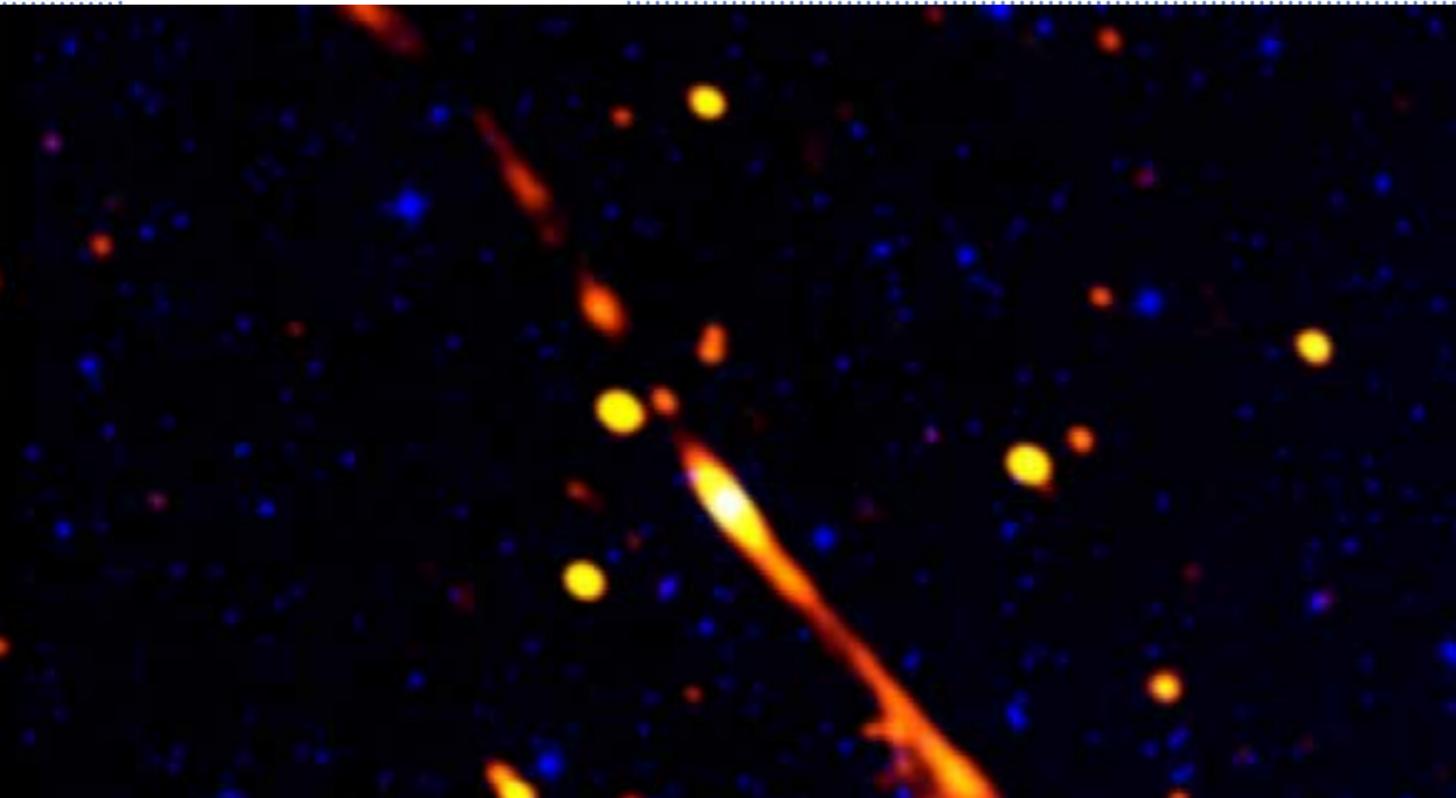


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MeerKAT identifies a new Giant Radio Galaxy. Infrared emission in blue and MeerKAT radio emission in orange. Image credit: Infrared data: Nasa's Wide-field Infrared Survey Explorer; radio data: MeerKAT telescope.

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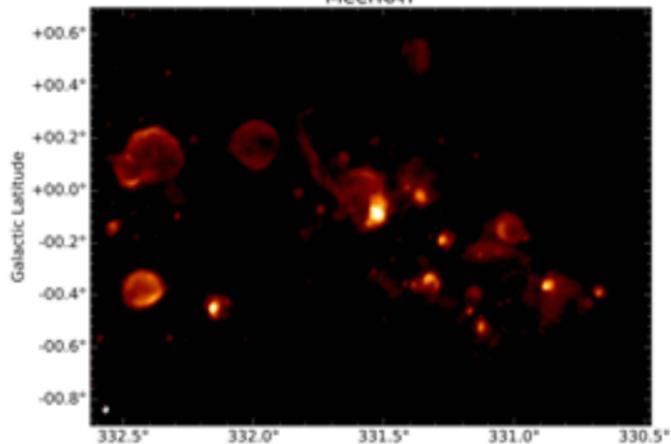


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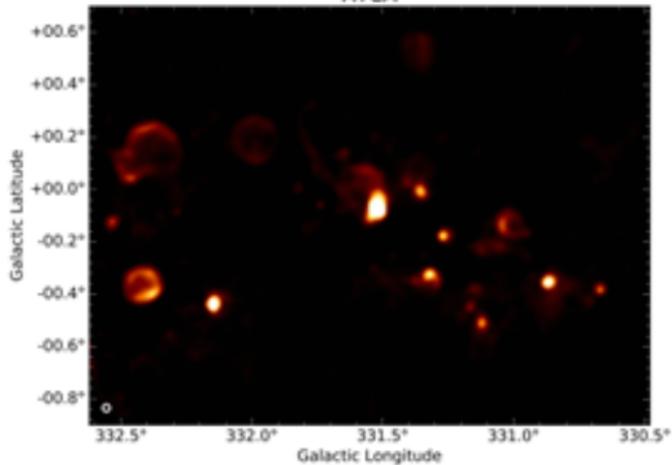
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MeerKAT



Galactic Longitude

ATCA



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Large scale bubbles and arcs seen with MeerKAT show stellar nurseries (where stars are born) in the Milky Way. For comparison, the previous best image of this star-forming region is shown at the bottom, obtained with the Australia Telescope Compact Array (ATCA). Credit: Left: MeerKAT radiotelescope. Right: CSIRO's ATCA radiotelescope.

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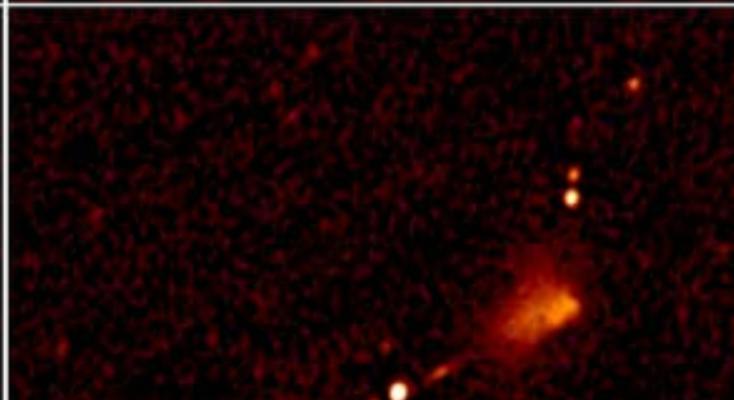
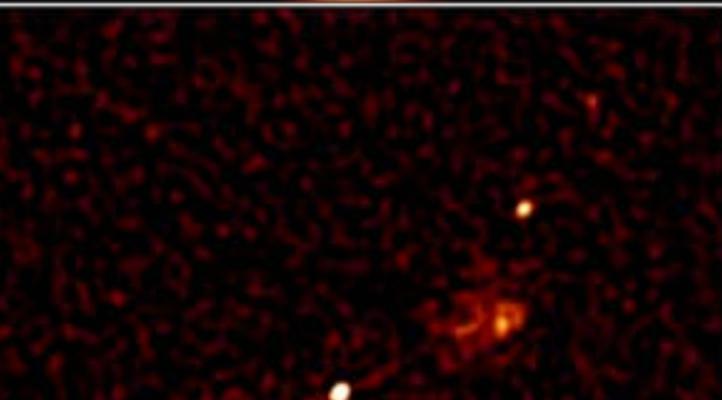
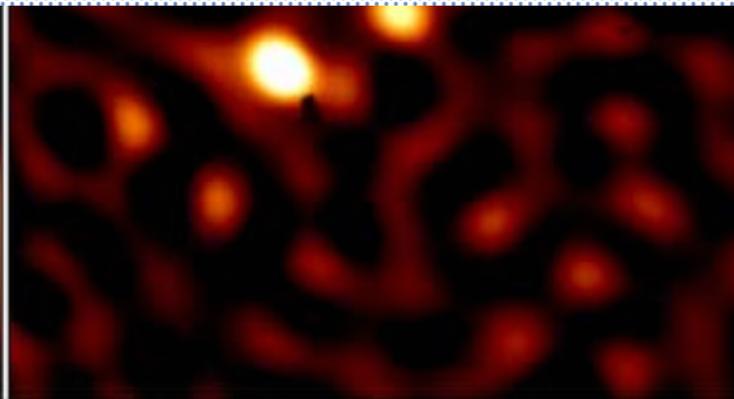
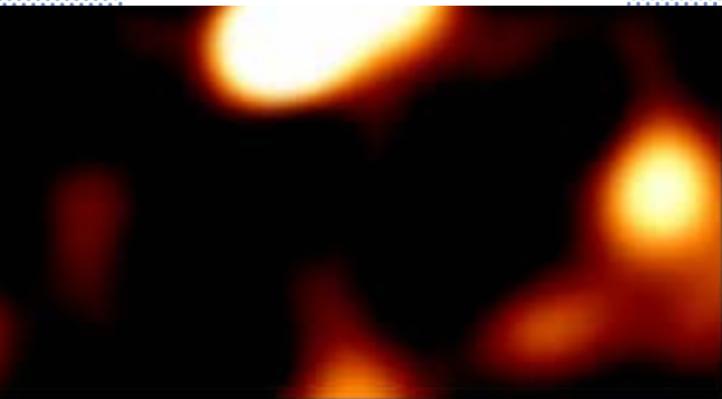


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On the top left panel the black hole was observed with the KAT-7 telescope. The top right shows the first view that MeerKAT had of the black hole, when the array consisted of merely four antennas. The bottom panels show the view MeerKAT has with 16 antennas: from the initial array release of June 2016 ("First Light" image) on the bottom left, and from the array of April 2017 on the bottom right. Notice the increased detail, and fainter features, that can be seen as the telescope improves. The radio jets span approximately  $1/10^{\text{th}}$  the diameter of the Moon.

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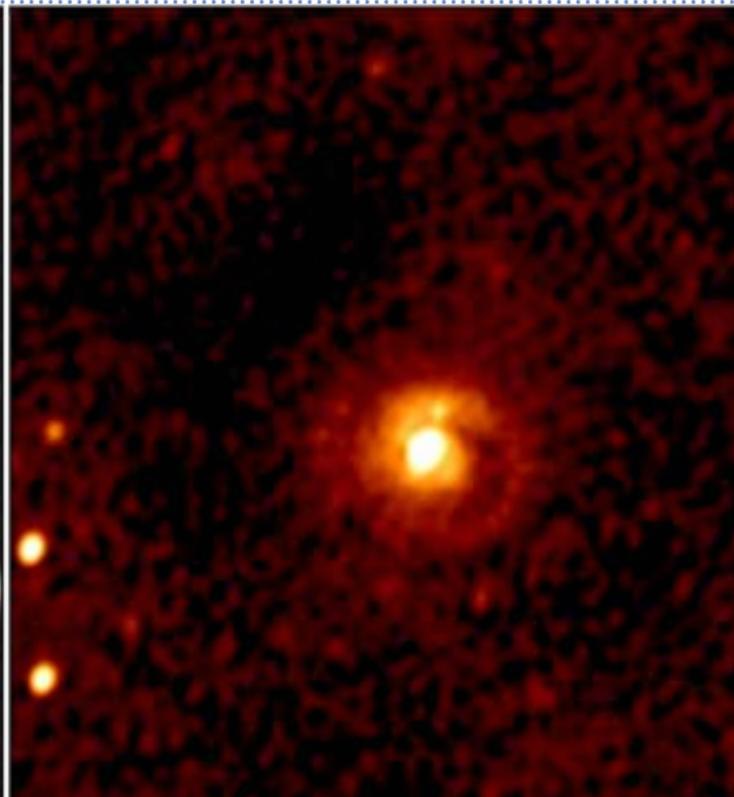
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First radio image of a spiral galaxy 230 million light years from Earth. In one small patch of the “DEEP2” field, MeerKAT’s commissioning scientists have made the first ever radio image (right panel) of a spiral galaxy previously photographed in visible light (left panel; the streak is an image artifact). Credit: optical data: Digitised Sky Survey, radio data: MeerKAT.

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A MeerKAT radio telescope antenna on the SKA site at Losberg in the Karoo, in the Northern Cape province of South Africa.

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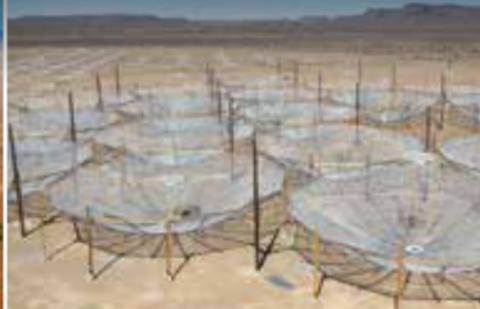


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**SKA IN AFRICA**



**HERA**



**KUTUNSE**



**C-BASS**



**KAT-7**



**MeerKAT**



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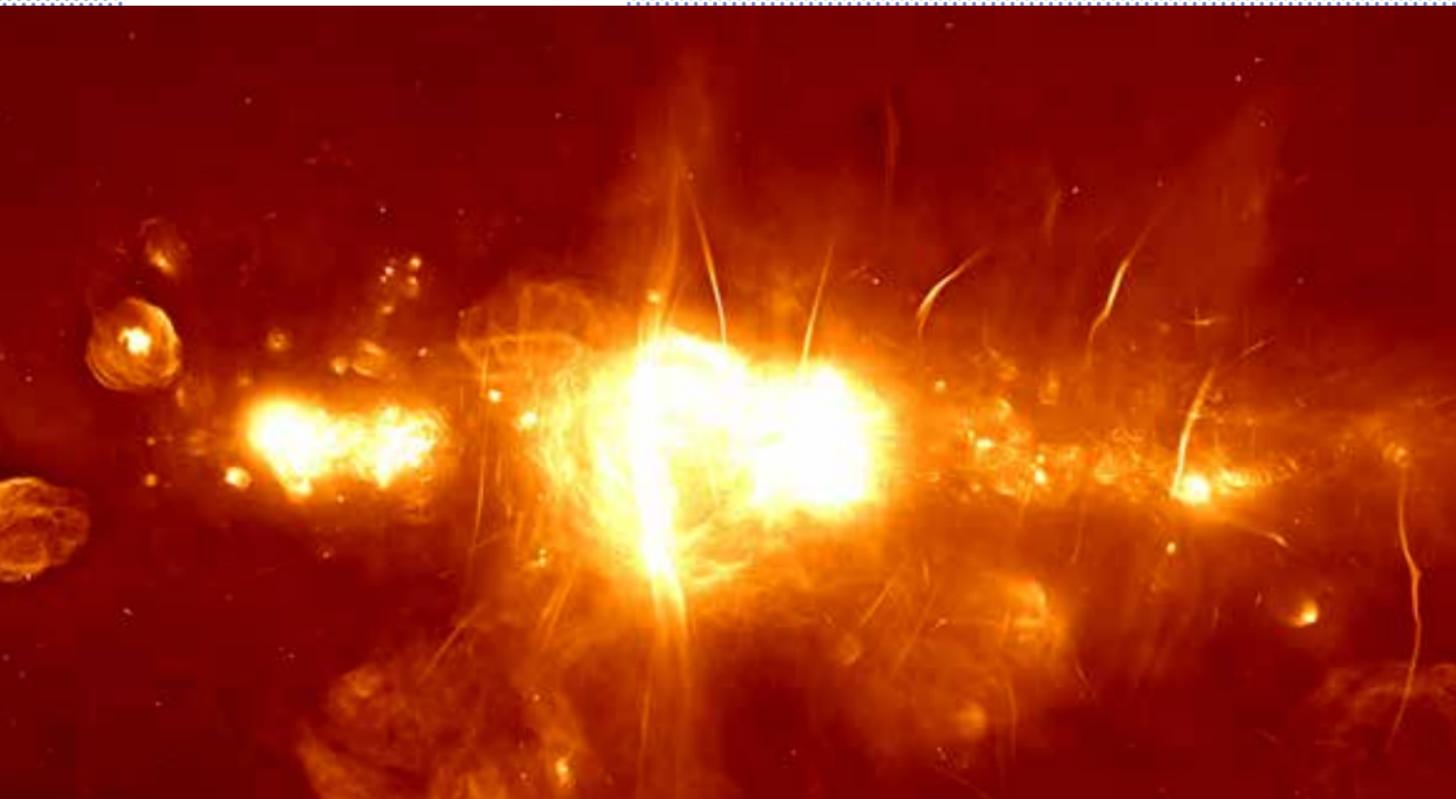
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This image, based on observations made with South Africa's MeerKAT radio telescope, shows the clearest view yet of the central regions of our galaxy. At the distance of the galactic centre (located within the white area near image centre), this 2 degree by 1 degree panorama corresponds to an area of approximately 1,000 light-years by 500 light-years. The colour scheme chosen here to display the signals represents the brightness of the radio waves recorded by the telescope (ranging from red for faint emission to orange to yellow to white for the brightest areas). This image shows a wealth of never before seen features, as well as a clearer view of previously known supernova remnants, star-forming regions, and radio filaments.

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SKA IN AFRICA



C-BASS



KUTUNSE



MeerKAT



KAT-7



HERA



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