

24 March 2021

## MEDIA RELEASE

### UP part of global team that reveals behaviour of magnetic fields around black holes

The Event Horizon Telescope (EHT) collaboration – which produced the first-ever image of a black hole and of which the University of Pretoria (UP) is an associate institute – has revealed a new view of the massive object at the centre of the M87 galaxy: what it looks like in polarised light.

This is the first time that astronomers have been able to measure polarisation, a signature trait of magnetic fields, this close to the edge of a black hole. The observations are key to explaining how the M87 galaxy, which is located 55 million light years away, is able to launch energetic jets from its core. The research involved more than 300 researchers from multiple organisations and universities worldwide, and the findings were published today by the EHT collaboration in two separate papers in *The Astrophysical Journal Letters*.

The image of the black hole that scientists released on 10 April 2019 revealed a bright ring-like structure with a dark central region, the black hole’s shadow. Since then, the EHT collaboration has delved deeper into the data on the object at the heart of the M87 galaxy collected in 2017, and discovered that a significant fraction of the light around the M87 black hole is polarised. The team were able to directly observe the black hole shadow and the ring of light around it, with the new polarised-light image clearly showing that the ring is magnetised.

“We are now seeing the next crucial piece of evidence to understand how magnetic fields behave around black holes, and how activity in this very compact region of space can drive powerful jets that extend far beyond the galaxy,” says Monika Mościbrodzka, coordinator of the EHT Polarimetry Working Group and Assistant Professor at Radboud University in the Netherlands. “Unveiling this new polarised-light image required years of work due to the complex techniques involved in obtaining and analysing the data,” adds co-coordinator of the Working Group, Iván Martí-Vidal, a GenT Distinguished Researcher at the University of Valencia in Spain.

Light becomes polarised when it goes through certain filters, like the lenses of polarised sunglasses, or when it is emitted in hot regions of space that are magnetised. In the same way that polarised sunglasses help us to see better by reducing reflections and glare from bright surfaces, astronomers can sharpen their vision of the region around the black hole by looking at how light originating from there is polarised. Specifically, polarisation allows astronomers to map the magnetic field lines present at the inner edge of the black hole.

Astronomers have relied on different models of how matter behaves near black holes to better understand this process. But they still don’t know exactly how jets larger than the galaxy are launched from its central region, which is as small as the solar system, nor how exactly matter falls into the black hole.

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With the new EHT image of the black hole and its shadow in polarised light, astronomers have been able to look into the region just outside the black hole where this interplay between matter flowing in and being ejected is happening.

“UP has been proud to be an associate institute of the EHT collaboration since 2018, forming part of an international collaboration that creates the sharpest images in astronomy,” explains Professor Roger Deane, founder of the UP Radio Astronomy Research Group and now UP Extraordinary Professor. “This globe-spanning team and network of telescopes work in concert to reveal previously unseen features of black holes. It’s wonderful to build up UP postgraduate student expertise in this exciting, cutting-edge scientific endeavour within which Southern Africa has a unique role to play.”

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A global press release including pictures and multimedia material from the Event Horizon Telescope collaboration can be found [here](#).

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## ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on the Hatfield Campus, Pretoria. This 113-year-old institution is also the largest producer of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country that has a Faculty of Veterinary Science which is ranked top in Africa, and overall has 120 academic departments, as well as 92 centres and institutes, accommodating more than 55 000 students and offering about 1 100 study programmes.

UP is one of the top five universities in South Africa, according to the 2019-2020 rankings by the Center for World University Rankings. It is also ranked among the top 100 universities worldwide in three fields of study (veterinary science, theology and law), and among the top 1% in eight fields of study (agricultural sciences, clinical medicine, engineering, environment/ecology, immunology, microbiology, plant and animal sciences and social sciences).

In May 2020, the annual UK Financial Times Executive Education Rankings once again ranked GIBS as the top South African and African business school. The University also has an extensive community engagement programme with approximately 33 000 students involved in community upliftment. Furthermore, UP is building considerable capacities and strengths for the Fourth Industrial Revolution by preparing students for the world beyond university and offering work-readiness and entrepreneurship training to its students.

As one of South Africa’s research-intensive universities, UP launched the Future Africa Campus in March 2019 as a hub for inter- and transdisciplinary research networks within UP and the global research community to maximise 4IR innovation and address the challenges and stresses our continent and world is facing. In addition UP also launched the Javett Art Centre in September 2019 as a driver of transdisciplinary

research development between the Humanities and other faculties. In November 2020 UP launched Engineering 4.0. as a hub not only for Smart Cities and Transport, but also to link the vast resources in technology and data sciences to other faculties via Future Africa. These initiatives are stimulating new thinking at the frontier of 'science for transformation'.

For more information, go to [www.up.ac.za](http://www.up.ac.za)