



Seeing the Invisible 看見不可見的神秘黑洞



For decades, black holes remain one of the most mysterious objects in the universe. What scientists know about a black hole is that it is extremely dense, and it is a region in space where the force of gravity is so strong that not even light can escape. Because of this, black holes are not directly observable. However, a breakthrough has been made in astronomy this year. On April 10, scientists unveiled the very first image of a black hole in human history. This supermassive black hole is located 50 million light year away from our planet in the center of a galaxy dubbed Messier 87. Its mass equals to 6.5 billion suns.

數十年來，黑洞一直是宇宙中最神秘的事物。科學家所知的黑洞，是一個密度極高、重力場極大的天體，連光線都無法逃脫。因此，黑洞是無法直接觀察到的。然而就在今年，天文學有了重大突破。四月十日，科學家公開了人類史上第一張黑洞的影像。這個超大質量黑洞距離地球約五千萬光年，位於 Messier 87 星系的中心。其質量是太陽的 65 億倍。

Word Bank (字彙表)

1. mysterious (adj.) 神秘的
2. universe (n.) 宇宙
3. gravity (n.) 重力
4. astronomy (n.) 天文學
5. unveil (v.) 揭露
6. galaxy (n.) 星系
7. dub (v.) 命名
8. mass (n.) 質量
9. capture (v.) 捕捉；擷取
10. integrate (v.) 整合





What the image has captured is not the black hole itself, but the “shadow” of it, according to Professor Heino Falcke of Radboud University in the Netherlands. The edge of the dark shadow is what scientists called the “event horizon,” a point beyond which nothing returns. The bright ring surrounding the black shadow shows the superheated gas falling into the black hole.

科學家發佈的影像並非黑洞本身，而是黑洞的「暗影」，荷蘭奈梅亨大學法爾克教授表示。黑洞的邊界稱為「事件視界」。事件視界內的任何東西都無法逃脫出來。黑洞暗影周圍的新月形光環捕捉到的是正在墜入黑洞的高溫氣體。



This remarkable picture is the achievement of an international collaboration of more than 200 researchers in a project called the “Event Horizon Telescope (EHT).” To take a picture of a black hole that is so distant from our planet, according to Katie Bouman, a member of the EHT project, is like “taking a picture of an orange on the moon.” It requires a telescope with the size of the entire earth to succeed. By adopting a technique called very-long-baseline interferometry (VLBI) and integrating the data from a worldwide network of eight telescopes positioned in in Mexico, Hawaii, Arizona, Chile, Spain and the Antarctica, the EHT team successfully captured the very first image of a black hole that matches Einstein’s predictions in the theory of general relativity.

這張劃時代的影像是全球超過 200 名研究員協同合作的成果。這項觀測計畫名為「事件視界望遠鏡計畫」(EHT)。EHT 計畫成員之一的布曼表示，拍攝距離地球如此遙遠的黑洞影像，相當於從地球「拍攝一顆在月球上的橘子」，需要等同於地球大小的望遠鏡才能辦到。EHT 團隊採用特長基線干涉法 (VLBI) 的技術，將位於墨西哥、夏威夷、美國亞利桑那州、智利與南極的八座望遠鏡觀測資料整合起來，成功擷取到史上第一張印證了愛因斯坦廣義相對論的黑洞影像。

◎資料及圖片來源

<https://ppt.cc/fyb7jx>

<https://ppt.cc/f5WHTx>

https://www.youtube.com/watch?v=_GsTBTenBZY

◎應用外語系 丘羽先老師 編譯

