

United we stand

The stunning picture of a black hole shadow that was released by the Event Horizon Telescope highlights the power of collaborative projects, as no single person, telescope or nation could have captured such an image.

The first image of a black hole was released to great fanfare by the Event Horizon Telescope (EHT) collaboration on 10 April 2019 at six coordinated press conferences around the world. Indeed, the image of a bright blurry ring went viral and launched a thousand memes, many of them doughnut related. Capturing the black hole shadow — a result of the gravitational bending of light and capture of all photons within the event horizon of the black hole in Messier 87 — was the culmination of decades of research involving hundreds of people.

But as with all ambitious projects, not everything has always gone smoothly. For a start, it wasn't clear that the astronomers would succeed at imaging the event horizon of a black hole, effectively [seeing the unseeable](#), as project director Shep Doeleman puts it. In 2007, a prototype array involving three observatories provided hope. Then there were the technical challenges in expanding the network, such as linking eight radio observatories that were built as independent entities to act as one very long baseline interferometry array the size of the planet. In terms of bandwidth, sensitivity and resolution, the EHT collaboration couldn't be sure their network was good enough until it was good enough. And in April 2017, it was definitely good enough on four separate days. However, there would be more waiting to come as the hard drives had to be carried to the two data centres to combine all the collected data, and those from the South Pole Telescope had to wait out the winter.

Those issues can be labelled 'known unknowns'. With enough determination and resourcing, it was just a matter of time. That so many funding agencies kept faith in the project is very heartening. What is really surprising, in an 'unknown unknown' kind of way, is the [fallout](#) since the black hole image went viral. Somehow, Katie Bouman, a member of the imaging team within the EHT, was singled out for her contribution to the now famous image. On one side the media had wanted to ensure that a woman

got due credit for her work and misguidedly piled it all on Bouman, with some news outlets going so far as to call her "the woman behind the first black hole image"; Bouman has always said that it was a team effort on the part of 200-plus people. On the other, in a most farcical way, internet trolls have tried to discredit her, claiming instead that fellow team member, Andrew Chael, did all the work. (He has vigorously [set the record straight on Twitter](#).)

The media circus exposes several issues. Firstly, sexism is rife, but let us fight this ugly facet of the internet another day. Another problem is that the public likes to have a 'face' rather than the featureless anonymity of a collaboration. That outdated 'lone genius' trope misses the whole point of a collaboration and the nature of modern research, particularly in particle physics, where collaborations can exceed 5,000 members. For example, when the spokespersons of the Atlas and CMS teams were awarded a share of the Breakthrough Prize for the Higgs boson detection in 2012, Fabiola Gianotti (then Atlas spokesperson, now Director General of CERN) insisted: "This is not a prize for me, it's a prize for the collaboration, and it recognizes the hard experimental work everyone involved has done over the years." Similarly, her counterpart at CMS, Joe Incandela, praised the whole team. Both, along with other CERN awardees, have donated their prize money to help young researchers and science education.

With the advent of mega telescopes and space missions, astronomers have also had to adopt large collaborations. We can learn from the [particle physics community](#), where the collective spirit is so deeply ingrained that few try to gain personal credit (those who do are viewed with suspicion or even disdain). However, when it comes to the careers of young scientists, how do collaborations promote the most deserving? When everyone has a thousand papers to their name, how do we unpick a person's actual contributions when they are applying for a job, say? Does the system

work for them? Yes, is the answer. There are working groups and sub-working groups in which one can demonstrate leadership and introduce fresh ideas for debate.

The first major results on the M87 black hole are rightly credited to the EHT collaboration as a whole. Given the redundancies built into the system, where separate teams analyse the same data independently to ensure unbiased and reliable results, how can any one individual stand out? It is possible for team members to write their own papers as first authors, explains Heino Falcke, chair of the EHT Science Council. These papers can describe specific methods or observations of other sources.

So far, the EHT observations are consistent with synthetic data from general relativistic magnetohydrodynamic simulations for a Kerr black hole of mass 6.5 billion solar masses, rotating in a clockwise direction. The brightness of the southern ring comes from the relativistic beaming of the emission that is moving towards the observer. Of course, these data do not rule out certain [alternative theories of gravity](#). The first wave of analysis has not revealed any unexpected features, but these are early days. Future time-dependent measurements will address the stability, shape and depth of the shadow (thought to be constant on human timescales; *Astrophys. J. Lett.* **875**, L1 (2019)). Longer-scale monitoring could yet show changes in the jet launching region, which may occur on a timescale of a year.

What is clear is that more show-stopping results, including images of the black hole at the centre of our own Galaxy, will be coming. Hopefully, all of us — members of the public, of governments and of the media — will understand that discoveries like these are only possible through the collective effort of many brilliant and hard-working people. To single out one person not only diminishes the rest, it shifts the spotlight away from what we should be celebrating. □

Published online: 9 May 2019
<https://doi.org/10.1038/s41550-019-0787-y>