Volunteer black hole hunters as good as the experts

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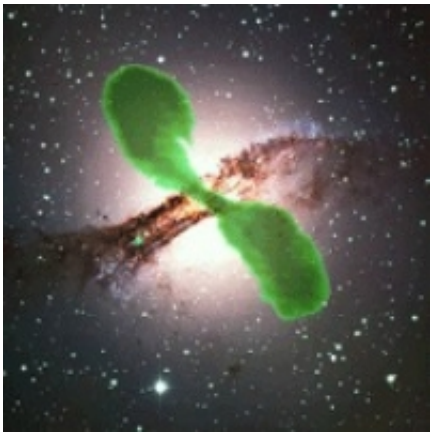


Trained volunteers are as good as professional astronomers at finding jets shooting from massive black holes and matching them to their host galaxies, research suggests.

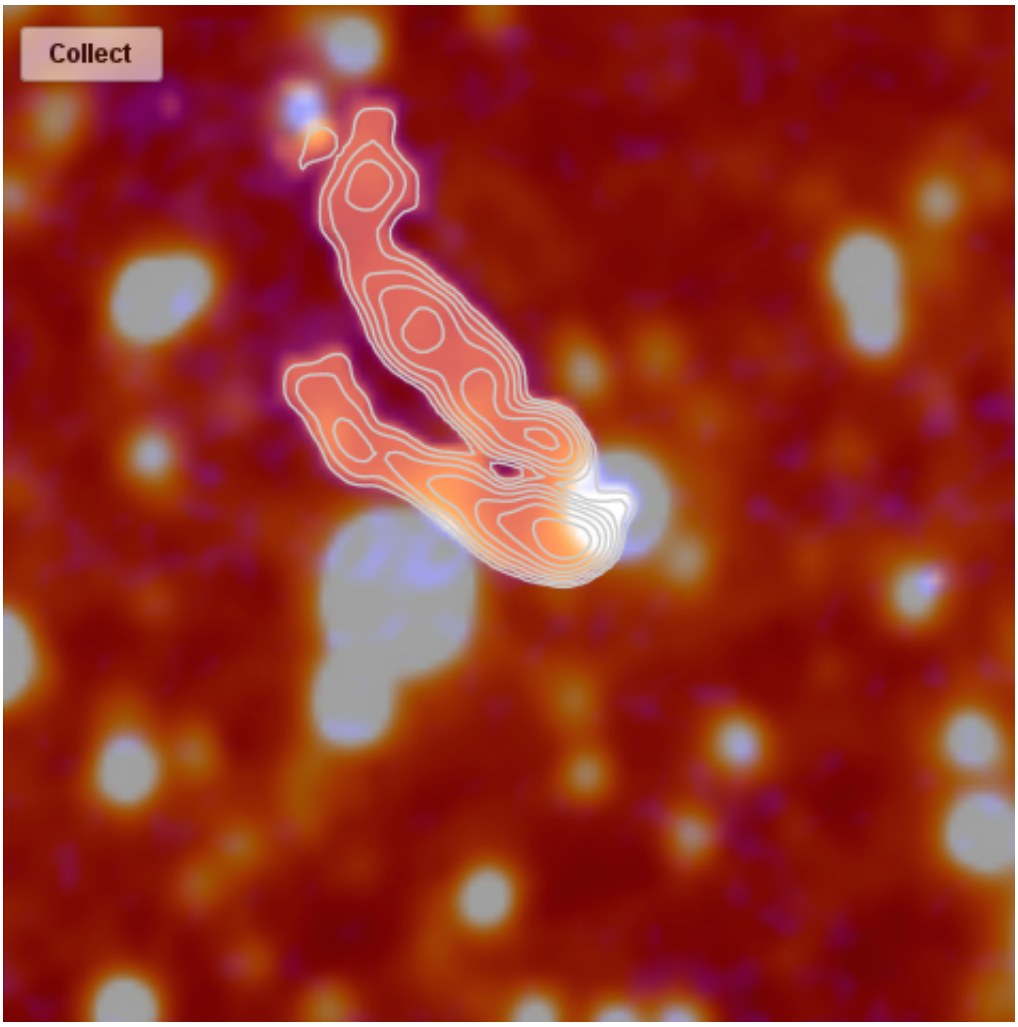
Scientists working on citizen cience project Radio Galaxy Zoo developed an online tutorial to teach volunteers how to spot black holes and other objects that emit large amounts of energy through radio waves.

Through the project, volunteers are given telescope images taken in both the radio and infrared part of the electromagnetic spectrum and are asked to compare the pictures and match the "radio source" to the galaxy it lives in.

The results from the first year of the Radio Galaxy Zoo project, led by Dr Julie Banfield of the ARC Centre of Excellence for All-Sky Astrophysics and The Australian National University and Dr Ivy Wong from The University of Western Australia, were published today in the *Monthly Notices of the Royal Astronomical Society*, Oxford University Press.

Before unleashing the eager crowd of online volunteers, the research team tested the same 100 images on both the trained citizen scientists and an expert team of 10 professional astronomers.

"With this early study we've comfortably shown that anyone, once we've trained them through our tutorial, is as good as our expert panel," Dr Banfield said.



A narrow-angled tail radio galaxy, where the bi-conical jets have been bent back somehow.

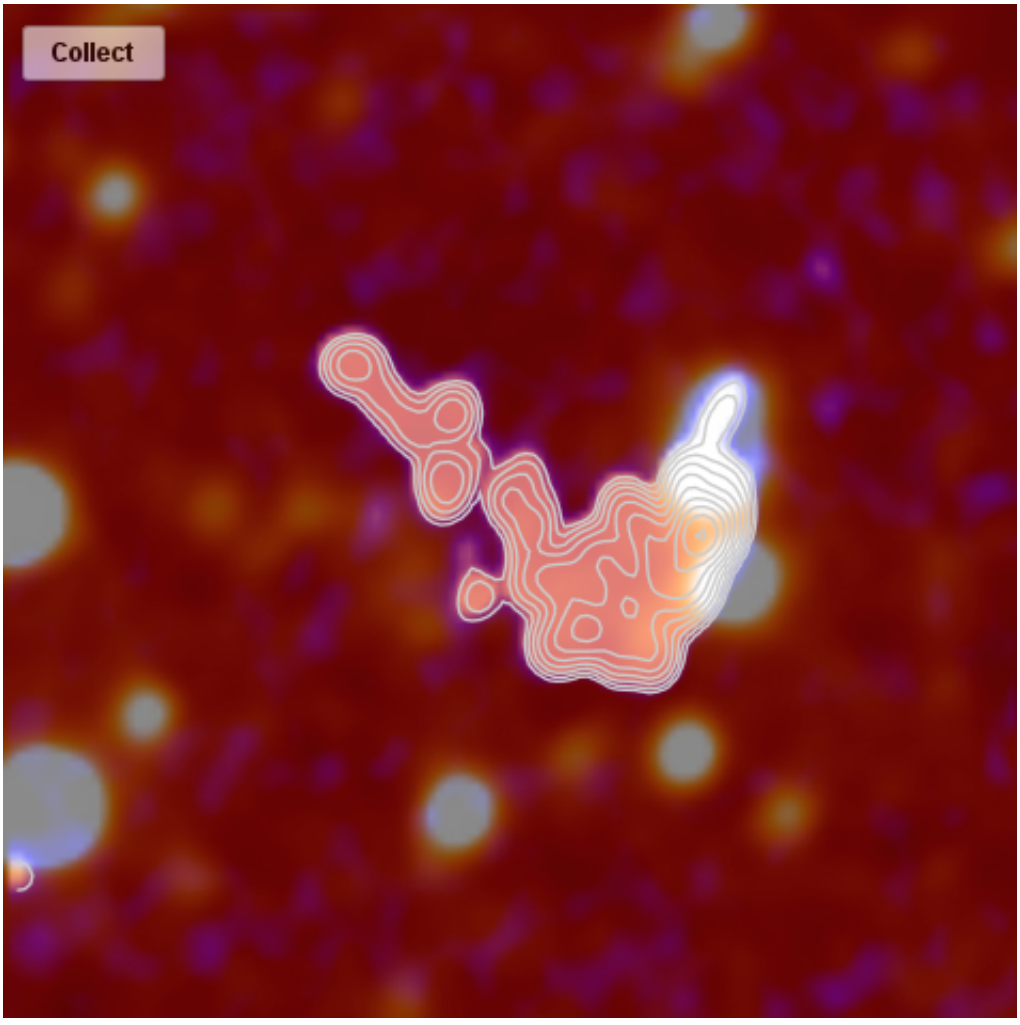
"The volunteers have already 'eyeballed' more than 1.2 million radio images from the Very Large Array in New Mexico, CSIRO's Australia Telescope Compact Array, and infrared images from NASA's Spitzer and WISE Space Telescopes."

In one year, the citizen scientists managed to match 60,000 radio sources to their host galaxy – a feat that would have taken a single astronomer working 40 hours a week roughly 50 years to complete.

"In the upcoming all-sky radio surveys, we are expecting 70 million sources – 10 per cent of which will not be classifiable by any of the computer algorithms currently available," Dr Wong said.

"This 10 per cent will have weird and complex structures that need a human brain to interpret and understand rather than a computer program.

"We have asked our volunteers to identify 170,000 radio sources that are most likely to have unusual structures using current datasets, so we are better prepared for what we could find in the upcoming next generation radio surveys."

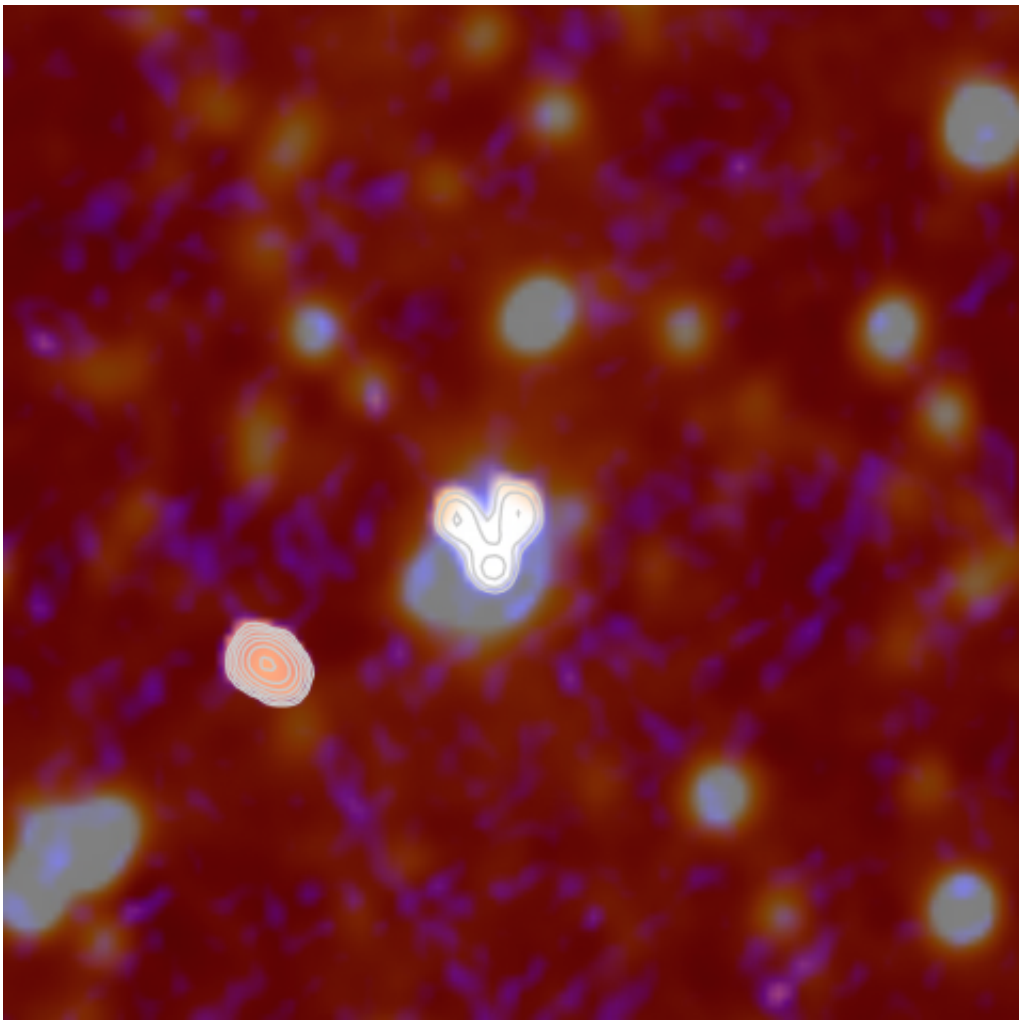


A wide-angled tail radio galaxy from the Radio Galaxy Zoo project.

At Radio Galaxy Zoo, professional astronomers talk to the participants every day on a dedicated forum and often ask them to look out for objects of interest.

"One member of the Radio Galaxy Zoo science team in Mexico loves looking for 'giants' – jets longer than a megaparsec, or about 125 times the distance from Earth to the centre of the Milky Way. These are typically very, very old radio jets," Dr Wong said.

Dr Ivy Wong is based at the UWA node of the International centre for Radio Astronomy Research (ICRAR), a joint venture between Curtin University and The University of Western Australia with support and funding from the State Government of Western Australia.



This is a galaxy we refer to as the Mickey Mouse radio galaxy because it looks like a pair of MM ears from Disneyland! But we truly have no idea what this is at this point.

Dr Banfield is part of "The Evolving Universe" research theme of the Australian Research Council Centre of Excellence for All-sky Astrophysics (CAASTRO).

Radio Galaxy Zoo is anonline project in which citizen scientists are helping scientists identify galaxies hosting jet-emitting massive black holes. See radio.galaxyzoo.org for more information, including

information on volunteering.

More information: "Radio Galaxy Zoo: host galaxies and radio morphologies derived from visual inspection." arxiv.org/abs/1507.07272

Provided by University of Western Australia