# Eight new repeating fast radio bursts detected

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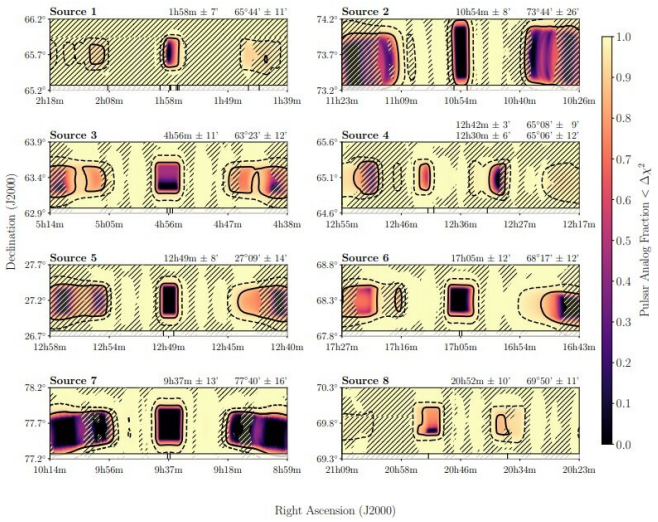


Detection positions of the new CHIME/FRB repeating FRB sources. Credit: Andersen et al., 2019.

Using the Canadian Hydrogen Intensity Mapping Experiment (CHIME) telescope, astronomers have identified eight new repeating fast radio burst (FRB) sources. The finding, reported in a paper published August 9 on arXiv.org, could shed new light on the origin and nature of these mysterious phenomena.

FRBs are intense bursts of radio emission lasting milliseconds and showcasing characteristic dispersion sweep of radio pulsars. The physical nature of these bursts is yet unknown, and astronomers consider a variety of explanations ranging from synchrotron maser emission from young magnetars in supernova remnants to cosmic string cusps.

The first FRB was discovered in 2007. Known as the Lorimer Burst, the bursts was a singular event such as a supernova. Five years later, the first repeating FRB was detected. Named FRB 121102, the source exhibits complex burst morphology, sub-burst downward frequency drifts, and also complex pulse phenomenology.

Although dozens of FRBs have been identified to date, only two of them were found to repeat their signals. These repeaters could be the key to resolving the mysteries of FRBs as astronomers anticipating the upcoming bursts can prepare extensive follow-up observational campaigns aimed at investigating such flashes in detail.

Now, a team of astronomers led by Bridget C. Andersen of McGill University in Montreal, Canada, reports the detection of eight new FRB repeaters, which could mean a breakthrough in studies of these flaring events.

"We report on the discovery of eight repeating FRB sources found using the Canadian Hydrogen Intensity Mapping Experiment (CHIME) telescope," the astronomers wrote in the paper.

The newly identified FRBs have dispersion measures ranging from 103.5 to 1,281 parsecs/cm$^3$. For the two FRBs with low dispersion measure, the astronomers cannot exclude the possibility that they are galactic halo objects. Hence, multi-wavelength follow-up observations for these sources are proposed in order to put constraints on their location.

The study found that one of the eight new FRBs has a rotation measure of -115 rad/m$^2$—much lower than that observed for FRB 121102. This allowed the astronomers to draw initial conclusions about the general properties of FRBs.

"This, and the absence of a comparably luminous persistent radio source in Sources 1 and 2 uncertainty regions, suggest not all repeaters share the environmental properties of FRB 121102," the paper reads.

Moreover, the researchers found that the repeating FRBs reported in the study generally have dispersion measures typical for the non-repeating FRBs so far identified with CHIME. However, they do show evidence of having larger burst widths than non-repeating bursts. This, according to the authors of the paper, could suggest different emission mechanisms in repeating and non-repeating sources.

The astronomers also found complex morphologies and downward-drifting sub-bursts in some of the eight new FRBs, what could indicate that such phenomenology is not necessarily observed in repeating sources.

In concluding remarks, the scientists underlined the significance of their discovery, noting that it represents an important progress in the ongoing hunt for FRBs. They added that the new sources present a great opportunity for follow-up studies, what could disentangle the mysterious nature of FRBs.

**More information:** B. C. Andersen et al. CHIME/FRB Detection of Eight New Repeating Fast Radio Burst Sources,arXiv:1908.03507v2 [astro-ph.HE]: arxiv.org/abs/1908.03507.



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