

Is Fast Radio Burst a new storyteller of the cosmos?



QUAMRUL HAIDER

JUST when we thought we had chronicled all the beasts of the cosmos, including black holes, a new one—the “Fast Radio Burst”—is howling at us. The blips of the radiation

emitted by the new beast are short-lived—less than five-thousandth of a second in duration. Hence the moniker “fast.” The “radio” portion of the label is due to the fact that the emission has long wavelength distinctive of radio waves. It is called a “burst” because the blips disappear as quickly as they appear, without any warning whatsoever.

The Fast Radio Burst, or FRB for short, was discovered in 2007 by astronomers while sifting through six-year-old archival data gathered with a radio telescope at Parkes Observatory in Australia. The puzzling discovery was initially thought to be a telescopic artefact, a trick of light masquerading as a cosmic oddity. Since then, numerous FRBs shooting across the sky have been detected at observatories elsewhere. Astronomers at the Canadian Hydrogen Intensity Mapping Experiment, or CHIME, located in British Columbia, had spotted hundreds of bursts since it came online in July 2018. According to a member of the team, they “lit up our telescope like a Christmas tree.”

While astrophysicists were brainstorming to understand these fleeting eruptions as a rare one-off episode, they were thrown off balance by the discovery of bursts that repeat at regular intervals. The first repeater, as they are called, was detected in 2012 at the Arecibo Observatory in Puerto Rico. In February of this year, CHIME detected a repeater that maintained a 16-day schedule, roaring for 4 days followed by 12 days of silence. The repeaters led astronomers to conclude that they “had to be something where the engine that produced [them] survived for the next flash.”

Releasing as much energy in one-thousandth of a second as the Sun releases in nearly a hundred years, the FRBs have become a cause célèbre

the bursts reach the Earth, they become low-energy radio waves.

There have been suggestions that the bursts could be generated by advanced alien civilisations trying to communicate with us. The alien hypothesis does not hold water because, among other things, in order to generate such ridiculously high-energy signals, their transmitters have to be unbelievably large, perhaps as large as our planet! Surely, by now, our

They believe that the bursts could be coming from colliding stars or fast-spinning neutron stars, which are the remnants of giant stars that died in a powerful luminous explosion known as supernova. Neutron stars are ultra-dense with roughly twice the Sun’s mass crammed into a sphere barely 20 kilometres in diameter.

Assuming FRBs last one-thousandth of a second and because the speed of radio waves is 300,000 kilometres per second, any object producing them could not be larger than 300 kilometres across—the distance radio waves can cover in one-thousandth of a second. This suggests that the source is considerably smaller than an ordinary star. It is, therefore, quite likely that the bursts are indeed coming from neutron stars.

Out of several dozen theories postulated to explain these rare occurrences, the one that is tenable posits that the source of Fast Radio Bursts could be magnetars, which are rapidly rotating neutron stars endowed with the strongest magnetic field observed in the Universe, as much as one thousand trillion times stronger than Earth’s magnetic field. Moreover, magnetars are known to erupt without warning, some for hours and others for months, before dimming and disappearing. Magnetars do not remain insanely magnetic for long, though. They have a lifespan of approximately 10,000 years, after which they settle down and become normal neutron stars.

Astronomers at CHIME did detect a one-off Fast Radio Burst that appeared to flare out of a magnetar inside our home galaxy, the Milky Way. However, scientists believe that the source of all blasts may not be magnetars. In fact, a star-forming dwarf galaxy that lies three billion light years away from Earth has been identified by researchers as

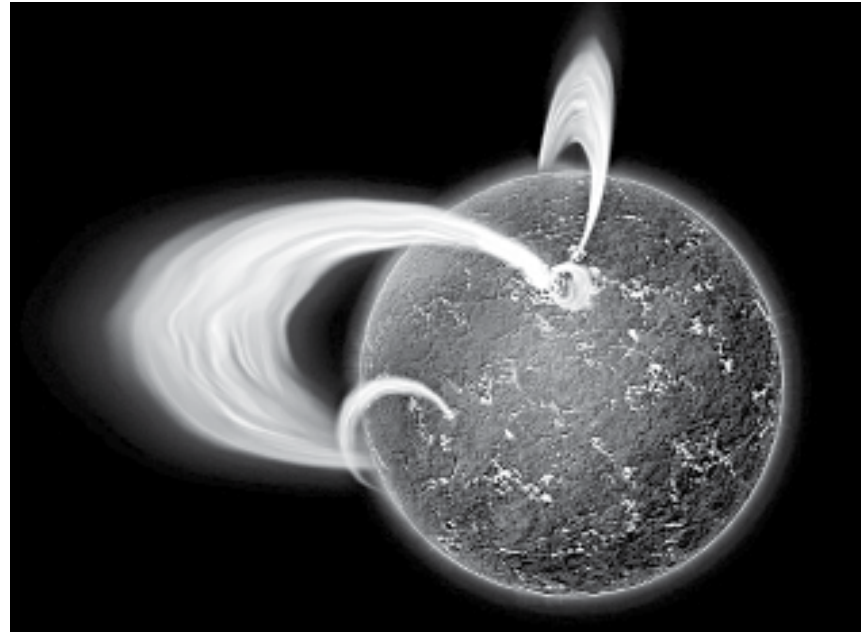
the source of a repeater. (A light year is the distance travelled by light in one year and is equal to 9.46 trillion kilometres.)

But this is not the end of the story. Although the ability to determine the location of the Fast Radio Bursts is a big leap towards solving the mystery, how they are produced still remains unknown. That is because establishing an acceptable theory of an astronomical phenomenon based on a few observations, as in the case of FRBs, is not easy. More observational data and detection of additional heretofore unseen patterns of the bursts are needed to nail down their source, as well as uncover the physics behind the creation of these enigmatic, terrifying cosmic monsters. In the meantime, all we can do is wait and watch with awe the fearsome display of their power.

To date, we have two storytellers of the Universe—Red Shift and Cosmic Microwave Background Radiation (CMBR). A red shift is the drift of the wavelength of a radiation toward longer values if sources of radiation are receding from the observer. The CMBR, on the other hand, is a relic of the hot, short wavelength radiation that emanated 378,000 years after the Big Bang and got red-shifted to cold, long wavelength microwaves characteristic of a temperature of negative 270 degrees Celsius.

By observing red shift in the spectra of radiation from far away galaxies, the first storyteller revealed to us that the Universe is expanding. The second storyteller, the CMBR, allows us to take a peek deep into space, and thus back into time. Now it seems Fast Radio Bursts have the potential to be the third storyteller to narrate hitherto untold tales of the cosmos.

Quamrul Haider is a professor of physics at Fordham University, New York.



This illustration shows how an extremely rapidly rotating neutron star, which has formed from the collapse of a very massive star, can produce incredibly powerful magnetic fields.

IMAGE CREDIT: NASA/CXC/M.WEISS

in scientific circles over the past few years. While extremely energetic at their source, the strength of the bursts decreases dramatically due to interaction with interstellar electrons and collision with other particles along the way, to the extent that by the time

space-based observatories, particularly the ever-reliable Hubble Telescope, and other deep space probes would have discovered planets housing Earth-sized transmitters.

Instead, most astronomers favour natural explanations of the incidents.

Digital Bangladesh Needs Digital Currency



TAMIM SUJAT

ANY remember 2009 as the period of the worst global financial crisis. But 2009 also gave us a new form of currency, redefining

the meaning of money. Bitcoin was launched in 2009 by an individual or a group known by the pseudonym “Satoshi Nakamoto”. Bitcoin gave the world the first application of blockchain and opened the realm of digital currencies, decentralised finance companies, and a 24/7 financial trading market.

Bangladesh is one of the few countries in the world that consider bitcoin and all other types of cryptocurrency as “hostile”. Bangladesh Bank considers bitcoin and other cryptocurrencies as illegal under the Foreign Exchange Regulation Act, 1947, and the Money Laundering Prevention Act, 2012. However, there is much debate on how these laws can be enacted in court since the central bank never correctly defined bitcoin as a currency or commodity. Regardless, the Bangladeshi authorities are adamant to stop the use of bitcoin and had issued warnings and even made arrests in relation to bitcoin trading and selling.

As we near the 50th anniversary of Bangladesh’ independence and continue our transition into the digital era, I think the country should reconsider how digital currencies can be more beneficial. Our closest neighbour, India has recently legalised buying and trading of cryptocurrencies. In March 2020, after a historic verdict

by the Supreme Court of India, cryptocurrencies were made legal and a previous ban imposed by the Reserve Bank of India was overruled. The way legalisation can be done can vary, but for now let me discuss why cryptocurrency adoption is helpful.

As a resident of Canada, I rarely visit the bank. Most of my banking needs are fulfilled online via a smartphone or computer. As Covid-19 took the world by storm, a strange incident shocked

their arrival was the collection of their salaries in person. Half of the country still does not have a bank account and many of these people still carry out their day-to-day spending in the form of cash. This is one of the core issues that digital currency can solve.

Over the last decade, there has been a significant increase in the number of private banks in Bangladesh. But despite the large increase, the percentage of the unbanked population remains high. Moreover, with several private banks having ever-increasingly large amounts of default loans and scandals, the general people by and large are sceptical of the banking system. Furthermore, the DSEX (Dhaka Stock Exchange Index) has gone from its peak of 8830 points in 2011 to about 4000 points at the present day. Looking in particular to the financial sector, the value is one-fourth of the 2011 peak.

Digital Taka is one of the ways the central bank can regain the faith of common citizens. By utilising a blockchain platform such as Ethereum (ETH), the central bank can itself issue an amount of Digital Taka and directly make it available at a 1:1 ratio to BDT for Bangladeshi citizens. The value of this money can be directly backed by central bank reserves and this requires no intervention from any third-party banks.

The citizens can utilise Digital Taka via a simple application, website, or text messaging.

The market capitalisation of all cryptocurrencies is about USD 274 billion, or about the same as Bangladesh’s GDP of 2018. Legalising cryptocurrencies provides the public with an opportunity to invest in a truly global market and at the same time create an ecosystem of decentralised

finance companies to start in Bangladesh.

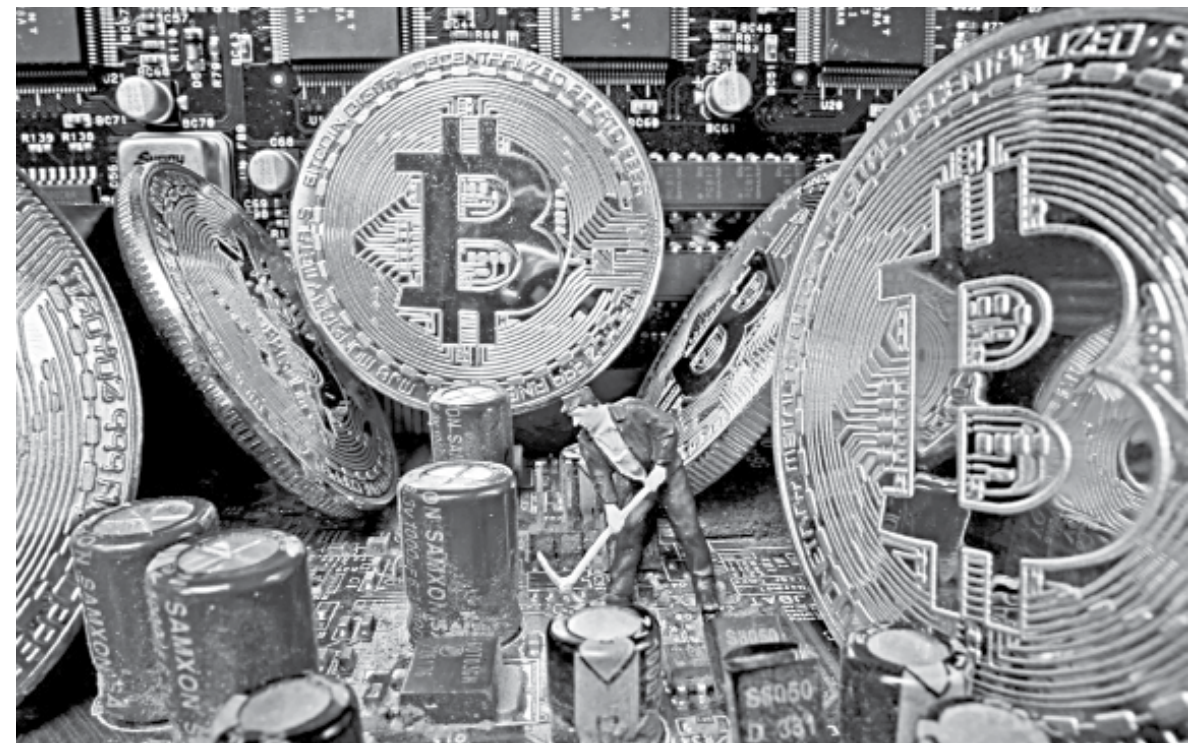
One of the worries that the government may have is the foreign flight of local capital. The Money Laundering Prevention Act, 2012 can be a useful tool to address this concern. It can ensure compliance for bitcoin and all other cryptocurrencies through the utilisation of foreign currency limits on cryptocurrencies, similar to the limits on standard

user-based quotas on National ID or passport. The government can also benefit from the large sum of capital tax gains this opportunity provides. After all, bitcoin is considered by many experts as the best performing asset class of the last decade.

These are just some of the many ways that digital currencies can revolutionise the archaic financial system we continue to rely on. A form of acceptance for the digital currency

As we near the 50th anniversary of Bangladesh’ independence and continue our transition into the digital era, I think the country should reconsider how digital currencies can be more beneficial. Our closest neighbour, India has recently legalised buying and trading of cryptocurrencies.

me and many others. While Bangladesh was on lockdown, thousands of RMG workers walked to the capital city and nearby districts from faraway destinations. The primary reason for



A visual representation of the virtual currency bitcoin.

PHOTO: REUTERS

foreign currencies as the US Dollar, Euro or Pound Sterling. This can be established by government-approved cryptocurrency exchanges and having

world can help us stay on the path of a truly Digital Bangladesh.

Tamim Sujat is an electrical engineer based in Toronto, Canada.

QUOTABLE Quote



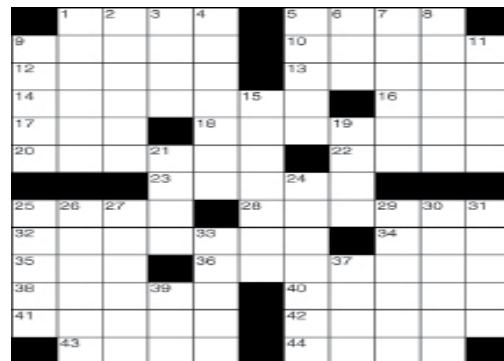
PETER DRUCKER (1909-2005)

Austrian-born US management consultant, educator, and author.

There is nothing so useless as doing efficiently that which should not be done at all.

CROSSWORD BY THOMAS JOSEPH

- ACROSS**
- 1 “-job!”
 - 5 Dance bit
 - 9 Available, as a room
 - 10 One of the primates
 - 12 Ticket category
 - 13 Copy for pasteup
 - 14 Kind of crisis
 - 16 Whole bunch
 - 17 Genesis name
 - 18 Pig’s wallowing spot
 - 20 One of Santa’s team
 - 22 Took in
 - 23 Famed fur tycoon
 - 25 Jai-
- DOWN**
- 1 Lady of riding fame
 - 2 Dodges
 - 3 Gambler’s giveaway
 - 4 Now and then
 - 5 Tatter
 - 6 Cal. abbr.
 - 7 Take on
 - 8 Prisoner’s hope
 - 9 Not feral
 - 11 Famous
 - 15 Sneaky
 - 19 Vengeful goddess
 - 21 Hard precipitation
 - 24 Phrase on a coin
 - 25 Fossil resin
 - 26 Mountain shrub
 - 27 Regard
 - 29 Enterprise captain
 - 30 Gives an address
 - 31 Valleys
 - 33 Muscat man
 - 37 Persia, today
 - 39 Cleveland cager



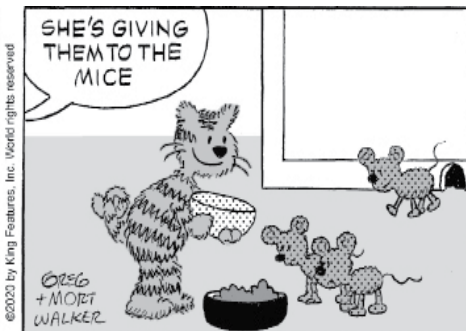
YESTERDAY’S ANSWERS

B A J A C O W S
A Z U R E O P A L S
N A M E D M E L E E
A L P W R E C K E D
L E E R I E R E V A
A D A N O E D E N
T I S B A T
J O H N M O T H S
A P E T E A S E T S
M E L L O W S L O T
B R I A N T W I N E
S A N D Y S I N E W
S E E S T E S

BEETLE BAILEY



BY MORT WALKER



BABY BLUES



BY KIRKMAN & SCOTT

WRITE FOR US. SEND US YOUR OPINION PIECES TO dsopinion@gmail.com.