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DOI
10.3847/1538-4357/ae2fc4

Publication date
2026

Document Version
Final published version

Published in
Astrophysical Journal

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Link to publication

Citation for published version (APA):
Shin, K., Curtin, A., Fine, M., Pandhi, A., Andrew, S., Bhardwaj, M., Chatterjee, S., Cook, A. M., Fonseca, E., Gaensler, B. M., Hessels, J., Jain, N., Kaspi, V. M., Kharel, B., Lanman, A. E., Lazda, M., Leung, C., Main, R., Masui, K. W., ... Stairs, I. (2026). CHIME/FRB Discovery of the Extremely Active Fast Radio Burst Source FRB 20240114A. *Astrophysical Journal*, *997*(2), Article 334. https://doi.org/10.3847/1538-4357/ae2fc4

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Download date:17 Nov 2026

The Astrophysical Journal, 997:334 (8pp), 2026 February 1 https://doi.org/10.3847/1538-4357/ae2fc4
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CHIME/FRB Discovery of the Extremely Active Fast Radio Burst Source FRB 20240114A

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Received 2025 May 19; revised 2025 December 13; accepted 2025 December 17; published 2026 January 30

Abstract

Among the thousands of observed fast radio bursts (FRBs), a few sources exhibit exceptionally high burst activity observable by many telescopes across a broad range of radio frequencies. Almost all of these highly active repeaters have been discovered by the Canadian Hydrogen Intensity Mapping Experiment/FRB project (CHIME/FRB), due to its daily observations of the entire northern sky as a transit radio telescope. FRB 20240114A is a source discovered and reported by CHIME/FRB to the community in 2024 January; given its low declination, even the detection of a few bursts hints at a high burst rate. Following the community announcement of this source as a potentially active repeater, it was extensively followed up by other observatories and has emerged as one of the most prolific FRB repeaters ever observed. This paper presents the five bursts CHIME/FRB observed from FRB 20240114A, with channelized raw voltage data saved for two bursts. We do not observe changes in the dispersion measure of the source greater than $\sim$1.3 pc cm^{-3} in our observations over a nearly 1 yr baseline. We find a rotation measure of $\sim+320$ rad m^{-2}. We do not find evidence for scattering at the level of $<$0.3 ms in the bursts, and we find no evidence for astrophysical scintillation. In our observations of FRB 20240114A, we see a burst rate $\sim$49 times higher than the median upper limit on the burst rate of apparent nonrepeaters also discovered by CHIME/FRB. With many thousands of bursts observed to date, FRB 20240114A has given the field an extraordinary opportunity to extensively study an FRB and understand its origins.

Unified Astronomy Thesaurus concepts: Radio bursts (1339); Radio transient sources (2008)

1. Introduction

Fast radio bursts (FRBs) are one of the most fascinating astrophysical phenomena observed in recent decades. These bursts have short time durations (typically $\sim$microseconds to milliseconds), high brightnesses ($\sim$Jy), and originate from extragalactic, even cosmological distances; for a recent review, see E. Petroff et al. (2022). Following the discovery of the first repeating FRB by L. G. Spitler et al. (2016), it is now known that $\sim$3% of FRBs are observed to repeat (CHIME/FRB

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Collaboration et al. 2023). The existence of these sources enables targeted follow-up observational campaigns from various observatories. Some of the most extensively studied FRB sources are sources that exhibited unusually active radio burst activity over a time interval of ∼weeks, observable across a broad range of radio frequencies. Such highly active sources, sometimes referred to as "hyperactive repeaters," include FRB 20201124A (A. E. Lanman et al. 2022; F. Kirsten et al. 2024) and FRB 20220912A (R. McKinven & CHIME/FRB Collaboration 2022), the latter of which reached observed burst rates of up to 390 hr^{-1} at 1–1.5 GHz (Y.-K. Zhang et al. 2023). Both of these sources were discovered by the Canadian Hydrogen Intensity Mapping Experiment/FRB project (CHIME/FRB) and announced to the community via Astronomer's Telegram (ATel[26]) notices.

Announcing the discovery of FRBs during their periods of heightened burst activity has enabled the community to focus its observations on these targets. For example, the highly active nature of FRB 20201124A and FRB 20220912A made them unique testbeds for probing the maximum energetics of FRBs (F. Kirsten et al. 2024; O. S. Ould-Boukattine et al. 2025a). Alerting the community to heightened source activity from a repeater also allows for quicker very long baseline interferometry (VLBI) localizations (e.g., K. Nimmo et al. 2022), probes of rotation measure (RM) and dispersion measure (DM) evolution (e.g., Y.-K. Zhang et al. 2023), and periodicity searches (e.g., C. Du et al. 2024).

Here we report the discovery of FRB 20240114A following our ATel announcement in 2024 January during FRB 20240114A's outburst. FRB 20240114A is one of the most recent examples of such an active FRB source, fruitfully followed up by many radio telescopes around the world. Soon after the ATel announcement (K. Shin & CHIME/FRB Collaboration 2024), the active nature of this source was observed by observations with the Parkes/Murriyang telescope (P. A. Uttarkar et al. 2024); small European radio dishes including the 25 m Westerbork RT1 telescope, the 25 m Stockert telescope, the 32 m Torun telescope, the 25 m Onsala O8 telescope, and the 25 m Dwingeloo telescope (O. S. Ould-Boukattine et al. 2024a, 2024b); the Five-hundred-meter Aperture Spherical radio Telescope (FAST; J. Zhang et al. 2024a); the Northern Cross radio telescope (D. Pelliciari et al. 2024); MeerKAT (J. Tian et al. 2024a); the upgraded Giant Metrewave Radio Telescope (U. Panda et al. 2025; A. Kumar et al. 2024); European VLBI Network (EVN) dishes as part of the PRECISE project (M. P. Snelders et al. 2024); the Nançay Radio Telescope (D. M. Hewitt et al. 2024); the Allen Telescope Array (P. Joshi et al. 2024); the 100 m Effelsberg telescope (P. Limaye & L. Spitler 2024); and the Robert C. Byrd Green Bank Telescope (J.-T. Xie et al. 2025). These community observations took place between 2024 mid-January and 2024 mid-May and spanned a broad range of radio frequencies, from 300 MHz up to 6 GHz.

The prompt follow-up observations resulted in a variety of fast-paced discoveries. Observations with the MeerKAT telescope enabled the localization of FRB 20240114A to a dwarf galaxy at $z = 0.1306 \pm 0.0002$ behind a foreground galaxy cluster (M. Bhardwaj et al. 2024; B. O'Connor et al. 2024; J. Tian et al. 2024a; X.-L. Chen et al. 2025). EVN/PRECISE observations have obtained a localization of FRB 20240114A to ∼milliarcsecond precision (M. P. Snelders et al. 2024; M. Bhardwaj et al. 2025). Using simultaneous observations with Effelsberg, the Thai National Radio Telescope, the Astropeiler Stockert, and the X-ray satellite XMM-Newton, X-ray-to-radio fluence ratios were constrained to $\eta_{x/r} < 2.4 \times 10^6$, assuming a cutoff power law physically motivated by the Galactic magnetar SGR 1935+2154. This constraint demonstrates that we cannot rule out the possibility of FRB 20240114A having a shared emission mechanism with SGR 1935+2154 (F. Eppel et al. 2025). A radio continuum counterpart was identified first in public MeerKAT data (X. Zhang & W. Yu 2024) and then with observations using the upgraded Giant Metrewave Radio Telescope (Y. Bhusare et al. 2024, 2025). VLBI observations with e-Merlin and the Very Long Baseline Array subsequently identified a possible persistent radio source (PRS) associated with FRB 20240114A (G. Bruni et al. 2025). Follow-up MeerKAT and Very Large Array observations conducted 26 days after the initial burst identified a possible compact flaring radio source, with spectrotemporal properties distinct from those of PRSs (X. Zhang et al. 2025). Gamma-ray emission from the Fermi instrument coincident with FRB 20240114A was also reported (Y. Xing et al. 2024), though the significance of this claim has been disputed by the Fermi-LAT Collaboration (G. Principe et al. 2024). Using *S*-band observations with the Kunming 40 m Radio Telescope, Y.-X. Huang et al. (2025) observed a possible flattening of the burst distribution toward higher energies, similar to what has been observed with other highly active FRB repeaters (e.g., D. Li et al. 2021; F. Kirsten et al. 2024; O. S. Ould-Boukattine et al. 2025a).

In this paper, we provide details on the original detection of FRB 20240114A (K. Shin & CHIME/FRB Collaboration 2024). We describe our observations with CHIME/FRB in Section 2, the repetition rate in Section 3, and burst properties in Section 4. In Section 5, we conclude with a discussion of the larger context of the source's repetition rate and burst properties.

2. Observations

The CHIME telescope is located at the Dominion Radio Astronomical Observatory near Penticton, British Columbia, Canada. As a transit telescope, it surveys the northern sky (decl. $> -11°$) roughly every day at 400−800 MHz (CHIME/FRB Collaboration et al. 2018; CHIME Collaboration et al. 2022). The CHIME/FRB system currently has by far the highest discovery rate of new FRB sources of all the presently operating radio observatories (CHIME/FRB Collaboration et al. 2021). All candidate events with a detection signal-to-noise ratio (S/N)[27] greater than 8 have intensity (Stokes *I*) data saved, at 0.983 ms time resolution. For bursts with S/N > 12 and bursts from candidate repeaters with S/N > 10, channelized raw voltage data ("baseband") are saved with a time resolution of 2.56 μs (D. Michilli et al. 2021).

FRB 20240114A was first detected on 2024 January 14 with S/N ∼ 8 and a DM of ∼528 pc cm^{-3}. Two more bright bursts were observed 4 days apart later that month (Figure 1); these two events triggered the CHIME/FRB baseband system and were streamed through the CHIME/FRB VOEvents service (T. C. Abbott et al. 2025).

[26] https://astronomerstelegram.org/

[27] For details on how the CHIME/FRB real-time S/N is determined for candidate events, see CHIME/FRB Collaboration et al. (2018).

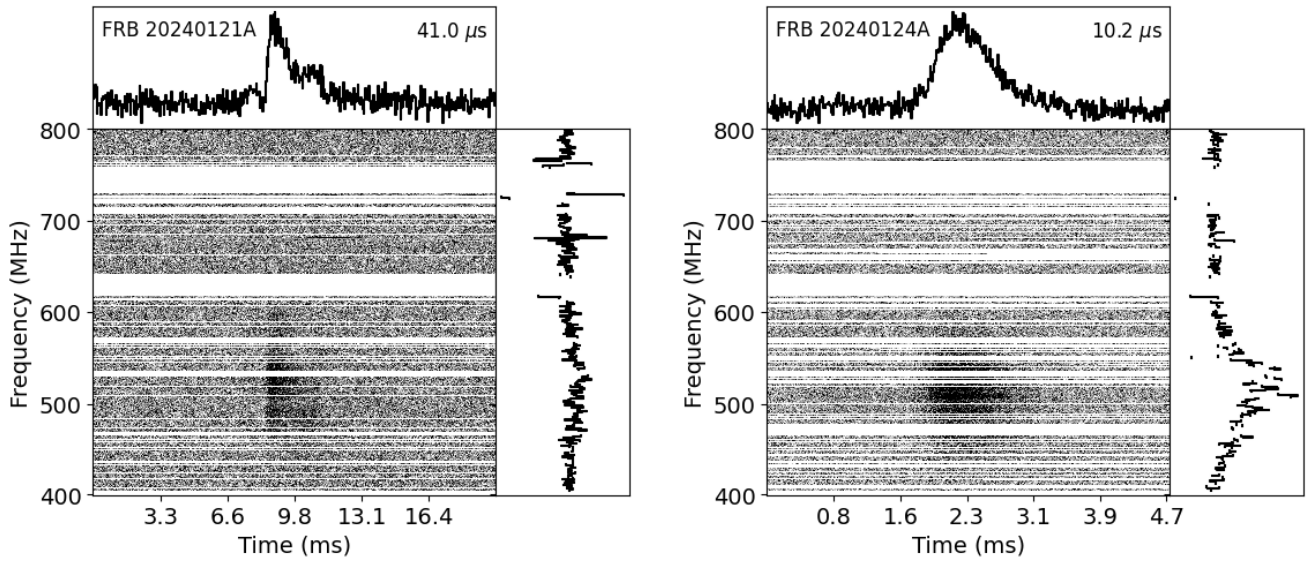

Figure 1. Dynamic spectra of the two bright bursts from FRB 20240114A, both with baseband data saved, plotted at a frequency resolution of 781.25 kHz. Radio frequency interference (RFI)-contaminated frequency channels are masked; in some channels, there are also missing data due to networking issues. Each burst was dedispersed to its structure-maximizing DM of ≈527.7 pc cm^{-3} (Table 1). Displayed with each dynamic spectrum subplot (main subpanels) are the Transient Name Server (TNS) names (top-left label), the time resolutions of the plotting (top-right label), the time-integrated spectra (right subpanels), and the frequency profiles (top subpanels).

3. Repetition Rate

While CHIME/FRB has observed a number of sources with higher apparent burst rates (e.g., A. E. Lanman et al. 2022; R. McKinven & CHIME/FRB Collaboration 2022; T. Abbott & CHIME/FRB Collaboration 2024; V. Shah et al. 2025), what was remarkable about FRB 20240114A was its low (4.3°) decl.. At such a low decl., CHIME's daily exposure to FRB 20240114A is ∼5.5 minutes day^{-1}, compared to a "typical" daily exposure of ∼15 minutes near zenith. We consider exposure to be when the position is within the FWHM of our formed beams at 600 MHz, estimated using the CHIME beam model,[28] when the system is completely on and sensitive. More details can be found in CHIME/FRB Collaboration et al. (2021).

The detection of two bright bursts within 4 days of each other at such a low decl. hinted at a high burst rate. For those two bursts, baseband data were saved, which allowed us to obtain a localization of FRB 20240114A to ∼arcminute precision (D. Michilli et al. 2021). This active source, along with its localization, was promptly announced to enable rapid community follow-up observations (K. Shin & CHIME/FRB Collaboration 2024).

From 2018 August 28 through 2025 February 14, the total CHIME/FRB exposure to FRB 20240114A at its best-known position (M. P. Snelders et al. 2024) is ∼104 hr. Three bursts (described below, but for which no baseband data were saved) were detected in the above time interval within the FWHM of our formed beams at 600 MHz. (The two bursts for which baseband data were saved were detected outside the FWHM, and thus are not considered in our exposure/rate calculations.) Using the methodology described by A. Josephy et al. (2019), we estimate a 95% fluence threshold of of 15.65 Jy ms. We thus obtain an overall burst rate of 0.03 hr^{-1} above a fluence threshold of 15.65 Jy ms.

We can compare the CHIME/FRB-observed burst rate of FRB 20240114A to the upper limits on burst rates of the apparent nonrepeaters in the CHIME/FRB Catalog 2 sample (CHIME/FRB Collaboration et al. 2026). These upper limits on burst rates were calculated by obtaining the exposure toward each apparent nonrepeating source. In order to be consistent with the repetition rate analyses previously presented on CHIME/FRB data (e.g., CHIME/FRB Collaboration et al. 2019; E. Fonseca et al. 2020; CHIME/FRB Collaboration et al. 2023; A. P. Curtin et al. 2025), to scale all burst rates to the same fluence threshold, we assume a power-law index of $\alpha = -1.5$ for the cumulative energy distribution, where 1.5 reflects a Euclidean spatial source distribution expectation. We find FRB 20240114A has a CHIME/FRB-observed burst rate ∼49 times higher than the median upper limit on the burst rate of apparent nonrepeaters in Catalog 2, and ∼12 times higher than the median upper limit on the burst rate of apparent nonrepeaters at a similar decl. ($4° \leqslant$ decl. $\leqslant 5°$). Thus, despite its relatively low overall burst rate activity, FRB 20240114A is still more active than the majority of sources as observed by CHIME/FRB. Such a comparison also indicates that it is unlikely that most bursts observed by CHIME/FRB at a similar decl. are repeating sources.

The "hyperactive" behavior of FRB 20240114A was soon confirmed by other radio telescopes at a variety of observing frequencies (e.g., P. Limaye & L. Spitler 2024; O. S. Ould-Boukattine et al. 2024b; J. Tian et al. 2024b; P. A. Uttarkar et al. 2024; J. Zhang et al. 2024a). One 1.38 hr observing session with the Robert C. Byrd Green Bank Telescope resulted in 359 bursts (J.-T. Xie et al. 2025). Additionally, a 30 minute observation with FAST revealed a burst rate of ∼500 hr^{-1} above a fluence threshold of 0.015 Jy ms in the FAST band of 1.0–1.5 GHz (J. Zhang et al. 2024b), the highest known burst rate quoted for any FRB to date. (To the best of our knowledge, none of these follow-up observations overlap with periods of time where FRB 20240114A would

[28] https://chime-frb-open-data.github.io/beam-model/

Table 1
Summary of Detections of FRB 20240114A from CHIME/FRB

TNS Name	ToA	S/N	DM (pc cm^{-3})	Width (ms)	τ (ms)	Peak Flux (Jy)	Fluence (Jy ms)
FRB 20240114A	2024-01-14 21:50:39	8.2	528.98 ± 0.15	2.1 ± 0.1	<0.42	1.2 ± 0.7	7 ± 2
FRB 20240121A[a]	2024-01-21 21:30:40	18.3	527.68 ± 0.02	[0.35 ± 0.02, 0.83 ± 0.08][b]	<0.35	91 ± 11	146 ± 19
FRB 20240124A[a]	2024-01-24 21:20:11	32.4	527.69 ± 0.03	0.330 ± 0.006	<0.330	1121 ± 115	1014 ± 108
FRB 20240224B	2024-02-24 19:11:24	9.2	528.33 ± 0.17	3.1 ± 0.2	<0.61	2.5 ± 1.2	10 ± 2
FRB 20250101A	2025-01-01 22:42:08	8.7	528.75 ± 0.11	[1.0 ± 0.2, 1.6 ± 0.7][b]	0.51 ± 0.28[c]	1.3 ± 0.6	2 ± 1

Notes. The ToA timestamps are referenced at 400 MHz (topocentric at CHIME near Penticton, Canada) and calculated using the DM indicated in the fourth column. S/N is as reported by the real-time detection pipeline. All uncertainties are quoted at the 1σ level. The scattering timescales (τ) are referenced to 600 MHz, assuming a scattering index of −4. In the case of an upper limit on the scattering timescale, they are reported as the 1σ, one-sided width of the narrowest sub-burst. Fluences are averaged over the entire 400–800 MHz observing band of CHIME.

[a] Bursts for which baseband data were saved. For these bursts, burst parameters were obtained by using `fitburst` on the baseband data.

[b] The two reported widths correspond to those of two distinct sub-bursts identified in the burst envelope.

[c] We caution that this source shows downward drifting, and hence a measurement of scattering at a lower time resolution is likely unresolved downward drifting.

have been within the FWHM of the CHIME/FRB formed beams at 600 MHz.)

We note that FRB 20240114A, originating from a redshift of $z \sim 0.13$, is more distant than the other extremely active sources FRB 20201124A ($z = 0.0979 \pm 0.0001$; C. D. Kilpatrick et al. 2021; W.-f. Fong et al. 2021) and FRB 20220912A ($z = 0.0771 \pm 0.0001$; V. Ravi et al. 2023), establishing that the high burst rates of these "hyperactive" repeaters are not due solely to an excess of low-luminosity bursts.

4. Burst Properties from CHIME/FRB

In order to infer the burst properties of FRB 20240114A from our CHIME/FRB observations, we use a least-squares optimization fitting framework called `fitburst` (E. Fonseca et al. 2024). This routine can be performed on the dynamic spectra of both intensity and baseband data (e.g., K. R. Sand et al. 2023, 2025; A. P. Curtin et al. 2025) and can estimate the following burst properties: DM, time of arrival (ToA), signal amplitude, pulse width, scatter-broadening timescale (τ), spectral index, and spectral running. If a burst appears to consist of multiple components, `fitburst` will estimate the signal amplitude, pulse width,[29] ToA, spectral index, and spectral running separately for each subpulse. The scatter-broadening timescale profile is assumed to depend on frequency as $\tau \propto \nu^{-4}$. Additionally, scattering timescales determined solely using intensity data can be unreliable, as downward drifting or unresolved components can easily be interpreted as scattering at low time resolutions. Additionally, given the measurement is in conflict with the limits using the higher-resolution baseband data, this strongly suggests that this is not scattering and is instead unresolved downward drifting. Hence, we caution against overinterpretation of the single scattering measurement made for this source using intensity data.

Fluxes and fluences are derived separately from burst fitting with `fitburst`, as they depend strongly on the CHIME beam model. For intensity data, reported fluxes and fluences are lower limits because of the large localization uncertainty of the burst within the CHIME synthesized beam. However, if an accurate position for a known source exists, then the synthesized beam attenuation can be corrected (B. C. Andersen et al. 2023); we apply this technique in this work for FRB 20240114A. Fluxes and fluences for baseband data are also corrected for the beam response (CHIME/FRB Collaboration et al. 2024). Thus, all flux and fluence values derived for FRB 20240114A are considered measurements (rather than lower limits for the intensity data). The resulting measured burst properties are summarized in Table 1. We note that the DM values obtained from intensity data likely have underestimated uncertainties due to unresolved burst substructure.

[29] This is the 1σ, one-sided width.

4.1. Scintillation

Scintillation, observable as a frequency-dependent modulation in brightness, can provide insights into the local environment of radio bursts and the intervening medium. The scintillation bandwidth follows the relation $\Delta\nu_d \propto \nu^{-\alpha}$, with $\alpha \sim 4$ (D. R. Lorimer & M. Kramer 2012). Using the NE2001 Galactic electron density model (J. M. Cordes & T. J. W. Lazio 2002), the expected Galactic scintillation bandwidth at 1 GHz is $\Delta\nu_d = 0.59$ MHz. Assuming $\alpha = 4$, the predicted value at 600 MHz is $\Delta\nu_d = 0.08$ MHz. In the baseband data, the frequency resolution is 0.39 MHz, but up-channelization can allow for finer-scale scintillation analysis at the cost of time resolution (e.g., E. Schoen et al. 2021; K. Nimmo et al. 2025).

We use the scintillation pipeline detailed by K. Nimmo et al. (2025) to search for scintillation scales in the autocorrelation functions of the burst spectra. We examine the two sets of saved baseband data for scintillation signatures at up-channelization factors of 32, 128, and 512, corresponding to frequency resolutions of 0.01, 0.003, and 0.0008 MHz, respectively. The duration of the two baseband bursts is ∼1 ms, which implies an intrinsic Fourier-limited frequency resolution limit of ∼0.001 MHz. Our highest up-channelization factor exceeds this limit.

We find no convincing evidence for astrophysical scintillation, either extragalactic or Galactic. J. Huang et al. (2025, in preparation) report an *L*-band burst from FRB 20240114A observed by the Nançay Radio Telescope (NRT) that shows scintillation barely unresolved in the 4 MHz observing channels, but consistent with NE2001 expectations. The nondetection of scintillation from the pipeline used on CHIME/FRB data could be due to systematics, self-noise, or decoherence. Quantifying the completeness of the CHIME/FRB scintillation pipeline to such effects is active work that is beyond the scope of this paper.

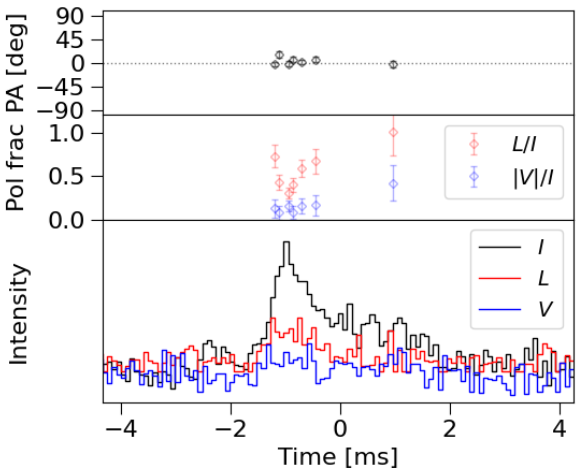

Figure 2. The polarization profile for FRB 20240121A. The top panel shows the polarization position angle. The middle panel shows the binned linear (red) and circular (blue) polarization component fractions. The bottom panel shows the frequency-averaged burst profile in arbitrary units for the total intensity (black), debiased linear polarization, and circular polarization. An RM of $+324.4\ \mathrm{rad\ m^{-2}}$ was used to derotate the burst.

4.2. Polarization

We also explored the polarimetric properties of FRB 20240114A for our two bursts with saved baseband data (TNS names FRB 20240121A and FRB 20240124A, respectively). The pulse, linear, and circular polarization fraction, and the polarization position angle profiles of the brighter of the two bursts, FRB 20240121A, are shown in Figure 2. We see a significant level of instrumental leakage in both bursts, which manifests as a peak in the Faraday dispersion function (FDF) centered at $\mathrm{RM} = 0\ \mathrm{rad\ m^{-2}}$. Following A. Pandhi et al. (2024), we mask out the peak at $0\ \mathrm{rad\ m^{-2}}$ and search for a secondary peak in the FDF exceeding a linearly polarized S/N of 6. Using the RM-synthesis algorithm (B. J. Burn 1966; M. A. Brentjens & A. G. de Bruyn 2005) as implemented by R. Mckinven et al. (2021), we obtain an improved polarized fit for both bursts with a secondary FDF peak at $|\mathrm{RM}| > 0\ \mathrm{rad\ m^{-2}}$. For FRB 20240121A, we obtain an RM of $+324.4 \pm 0.3\ \mathrm{rad\ m^{-2}}$ and a linear polarization fraction $L/I = 0.45 \pm 0.03$. For FRB 20240124A, we find a peak in the FDF at $\mathrm{RM} = +320\ \mathrm{rad\ m^{-2}}$ with $L/I = 0.44 \pm 0.01$. However, the FDF of this burst is Faraday complex, which could lead to an underestimation of its RM uncertainty, which, for Faraday simple peaks, is quantified as FWHM/(2S/N), where FWHM and S/N refer to the peak polarized intensity in the FDF. Thus, we apply a more conservative uncertainty for FRB 20240124A equal to the width of the theoretical RM spread function of CHIME/FRB ($9\ \mathrm{rad\ m^{-2}}$; C. Ng et al. 2020) and determine $\mathrm{RM} = 320 \pm 9\ \mathrm{rad\ m^{-2}}$. We note that due to the instrumental leakage present in both bursts, it is possible that our L/I measurements are underestimated. The circular polarization fraction in both bursts is consistent with instrumental effects.

The Galactic foreground RM expectation in the direction of FRB 20240114A is $-15 \pm 10\ \mathrm{rad\ m^{-2}}$ (S. Hutschenreuter et al. 2022). We do not find any RM variation between the two polarized bursts in our sample. Our RM results are consistent with those reported from other observations of FRB 20240114A at higher frequencies (e.g., J. Tian et al. 2024a; J.-T. Xie et al. 2025). The RM amplitude is also fairly large compared to the median |RM| from nonrepeating (A. Pandhi et al. 2024) and repeating (C. Ng et al. 2025) sources.

5. Discussion and Conclusion

Here, we present the initial detection of the hyperactive repeating FRB, FRB 20241104A, with CHIME/FRB. While we only detect five bursts from this source over a 6 yr period, the source's low decl., and hence short transit time, imply a high burst rate. Indeed, we determine a rate of 0.03 bursts $\mathrm{hr^{-1}}$ above a fluence threshold of 15.65 Jy ms for this source in CHIME's 400–800 MHz band. Assuming the rate scales as a power law with an index of −1.5, this corresponds to a rate of 0.16 bursts $\mathrm{hr^{-1}}$ above a fluence threshold of 5 Jy ms. Compared to the CHIME/FRB repeater rates presented by CHIME/FRB Collaboration et al. (2023), this source ranks in the top 15% of active repeaters detected by CHIME. Comparing its rate at CHIME frequencies to those at other bands is nontrivial, as instrument selection effects and sensitivity functions must be carefully accounted for. We therefore do not pursue this comparison further in this work.

The transit telescope nature of CHIME/FRB is a double-edged sword—while the observing strategy allowed for the serendipitous detection of FRB 20240114A, which in turn led to rapid and fruitful observations by the larger transient radio community, the limited exposure and lower sensitivity at lower declinations meant that CHIME/FRB only observed five bursts from FRB 20240114A, of which only two had bright enough S/N to obtain meaningful burst properties. Thus, in-depth analysis of its DM, scattering timescales, scintillation, and polarization properties were only possible for two out of the five bursts.

From the limited CHIME/FRB observations that exist for FRB 20240114A, we do not find evidence for scintillation down to 0.8 kHz. Our lowest scattering limit is $\tau < 0.33$ ms at 600 MHz, which translates to a scintillation bandwidth of 0.48 kHz ($\Delta\nu_{\mathrm{d}} \simeq (2\pi\tau)^{-1}$); it is thus possible that there is scintillation at bandwidths unexplored by our search between ∼0.48 and 0.8 kHz. However, we do not observe strong unresolved spectral modulation at our highest searched frequency resolutions, suggesting that the modulation index of the scintillation observed by the NRT is likely smaller at CHIME frequencies. Given that the scintillation observed by NRT is consistent with Galactic expectations, such a drop in modulation index could mean there is a second screen along the line of sight that decoheres the scintillation as a function of frequency (Z. Kader et al. 2024). We note that J. Tian et al. (2024a) also do not find evidence for scattering, with a limit of $<0.4 \pm 0.2$ ms at 1 GHz or <4 ms at 600 MHz assuming a ν^{-4} scaling. This limit is an order of magnitude less conservative than our results, consistent with expectations as higher-frequency observations have reduced sensitivity to scattering tails.

The two bursts we were able to obtain polarization measurements for show a modest linear polarization fraction of $L/I \approx 0.44$, at central frequencies of ≈500 MHz. This linear polarization fraction is significantly lower than what was measured by other telescopes at higher frequencies. Observations with MeerKAT discovered 62 bursts from this source with the ultrahigh frequency (544–1088 MHz) and L-band (856–1712 MHz) receivers (J. Tian et al. 2024a). They found that most of their bursts are 100% linearly polarized, and that some bursts show circular polarization fractions up to 20%.

Similarly, J.-T. Xie et al. (2025) found that 72% of the 297 bursts they detected with the Robert C. Byrd Green Bank Telescope with the *P*-band receiver (720–920 MHz) had linear polarization fractions greater than 90%. That CHIME/FRB sees significantly lower linear polarization fractions could be due to spectral depolarization, the magnitude of which is related to turbulence in the local environment (B. J. Burn 1966; P. A. Uttarkar et al. 2025). Depolarization has also been observed in other repeating FRB sources (e.g., Y. Feng et al. 2022; W.-J. Lu et al. 2023; R. Mckinven et al. 2023). However, without more lower-frequency data points (especially <700 MHz), we caution against overinterpreting this trend.

One additional benefit of CHIME's observations is that it can monitor for renewed burst activity "for free" over extended temporal periods. Indeed, the last CHIME/FRB detection of a burst from FRB 20240114A in early 2025 January, after over 10 months of nondetections, coincided with observations of renewed burst activity by the HyperFlash project (O. S. Ould-Boukattine et al. 2025b). About 2 weeks later, observations with the Shanghai Tianma Radio Telescope also detected a reactivation of burst activity at 2.25 GHz (X.-W. Wang et al. 2025).

FRB 20240114A raises the question of how many prolific repeating FRB sources at low declinations may have been missed in spite of CHIME's enormous, yet finite, field of view. Such sources definitely exist—MeerKAT observed FRB 20240619D, a source with an average burst rate of $>70\,\mathrm{hr}^{-1}$ at the *L* band above a $\sim$1 Jy ms fluence threshold (J. Tian et al. 2024c). Yet without a transit telescope similar to CHIME in the Southern Hemisphere, it is probable many extremely active FRB sources have gone undetected.

FRB 20240114A has demonstrated the power of quickly announcing the discovery of a new FRB source with heightened burst activity to the broader FRB community. No one radio telescope alone could have discovered FRB 20240114A and followed it up as extensively as FRB 20240114A has been studied. Few FRBs have had their burst activity behavior as well studied across a broad range of frequencies as FRB 20240114A has; such observations can be incredibly informative for source models (e.g., D. Li & J. J. Zanazzi 2021; T. Wada et al. 2021). In particular, the high detection rate of FRB 20240114A bursts with FAST ($>$11,000 spanning 57 observations over $\sim$7 months) allowed for unprecedented constraints on the energy budget of any given FRB source, providing the most stringent constraints on a possible magnetar source to date (J.-S. Zhang et al. 2025). Such a large number of burst detections from FRB 20240114A also provided a dataset with which to better understand burst clustering behavior from FRBs, including searching for periodicity signatures on both short and long timescales (D. Zhou et al. 2025), as has been seen in a select few other FRBs (e.g., CHIME/FRB Collaboration et al. 2020; K. M. Rajwade et al. 2020). In particular, the lack of significant short-scale periodicity indicates that rotation-driven models are unlikely to explain FRB 20240114A (K. Xu et al. 2021; H.-T. Lan et al. 2024). A subset of these bursts also had their morphological properties studied, with results hinting at burst morphology being reflective of underlying physical emission mechanisms (L.-X. Zhang et al. 2025). We anticipate further insights into the origins of FRBs to be enabled by the extensive observations of FRB 20240114A.

Acknowledgments

We acknowledge that CHIME is located on the traditional, ancestral, and unceded territory of the Syilx/Okanagan people. We are grateful to the staff of the Dominion Radio Astrophysical Observatory, which is operated by the National Research Council of Canada. CHIME operations are funded by a grant from the NSERC Alliance Program and by support from McGill University, University of British Columbia, and University of Toronto. CHIME was funded by a grant from the Canada Foundation for Innovation (CFI) 2012 Leading Edge Fund (Project 31170) and by contributions from the provinces of British Columbia, Québec, and Ontario. The CHIME/FRB Project was funded by a grant from the CFI 2015 Innovation Fund (Project 33213) and by contributions from the provinces of British Columbia and Québec, and by the Dunlap Institute for Astronomy and Astrophysics at the University of Toronto. Additional support was provided by the Canadian Institute for Advanced Research (CIFAR), the Trottier Space Institute at McGill University, and the University of British Columbia. The CHIME/FRB baseband recording system is funded in part by a CFI John R. Evans Leaders Fund award to IHS.

M.B. is a McWilliams fellow and an International Astronomical Union Gruber fellow. M.B. also receives support from the McWilliams seed grant. A.P.C. is a Vanier Canada Graduate Scholar. A.M.C. is a Banting Postdoctoral Researcher. E.F. is supported by NSF grant AST-2407399. The AstroFlash research group at McGill University, University of Amsterdam, ASTRON, and JIVE is supported by a Canada Excellence Research Chair in Transient Astrophysics (CERC-2022-00009); the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program ("EuroFlash"; grant agreement No. 101098079); and an NWO-Vici grant ("AstroFlash"; VI.C.192.045). V.M.K. holds the Lorne Trottier Chair in Astrophysics & Cosmology and a Distinguished James McGill Professorship, and receives support from an NSERC Discovery grant (RGPIN 228738-13). C.L. acknowledges support from the Miller Institute for Basic Research at UC Berkeley. K.W.M. holds the Adam J. Burgasser Chair in Astrophysics. D.M. acknowledges support from the French government under the France 2030 investment plan, as part of the Initiative d'Excellence d'Aix-Marseille Université—A*MIDEX (AMX-23-CEI-088). M.N. is a Fonds de Recherche du Qu'bec—Nature et Technologies (FRQNT) postdoctoral fellow. K.N. is an MIT Kavli Fellow. A.P. is funded by the NSERC Canada Graduate Scholarships—Doctoral program. A.B.P. is a Banting Fellow, a McGill Space Institute (MSI) Fellow, and a Fonds de Recherche du Quebec—Nature et Technologies (FRQNT) postdoctoral fellow. U.P. is supported by the Natural Sciences and Engineering Research Council of Canada (NSERC; funding reference number RGPIN-2019-06770, ALLRP 586559-23, RGPIN-2025-06396), Canadian Institute for Advanced Research (CIFAR), and AMD AI Quantum Astro. Z.P. is supported by an NWO Veni fellowship (VI.Veni.222.295). M.W.S. acknowledges support from the Trottier Space Institute Fellowship program. K.R.S. is supported by FRQNT doctoral research award. P.S. acknowledges the support of an NSERC Discovery Grant (RGPIN-2024-06266). K.S. is supported by the NSF Graduate Research Fellowship Program. FRB research at UBC is supported by an NSERC Discovery Grant and by the Canadian Institute for Advanced Research.

Facility: CHIME.

Software: `fitburst` (E. Fonseca et al. 2024), `matplotlib` (J. D. Hunter 2007), `NE2001p` (S. K. Ocker & J. M. Cordes 2024), `numpy` (C. R. Harris et al. 2020), `PyGEDM` (D. C. Price et al. 2021), `RM-CLEAN` (G. Heald et al. 2009), `RM-synthesis` (M. A. Brentjens & A. G. de Bruyn 2005), `RM-tools` (C. R. Purcell et al. 2020), `scipy` (P. Virtanen et al. 2020).

Author Contributions

K.S. led the analysis and writing of the paper. A.C., M.F., and A.P. contributed to analysis and writing of the paper. All other authors are listed alphabetically and were instrumental in acquiring the observations or contributed relevant scientific expertise to the project.

Appendix
Dynamic Spectra for Intensity-only Bursts

For three bursts, we do not have baseband data saved. In Figure 3, we show the waterfall plots for the bursts with intensity data.

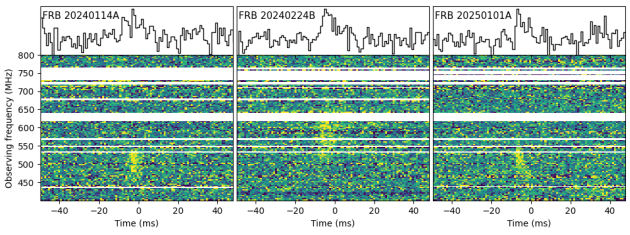

Figure 3. Dynamic spectra of the three bursts from FRB 20240114A for which only intensity data were saved. Each burst is dedispersed to the best-fit DM determined by `fitburst` (in Table 1). Displayed with each dynamic spectrum subplot (main subpanels) are the TNS names (top-left label) and the frequency profiles (top subpanels). Data are plotted at 3.125 MHz frequency resolution and 0.983 ms time resolution.

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