VLBI localization of FRB 20201124A and absence of persistent emission on milliarcsecond scales


Publication date
2021

Document Version
Final published version

Published in
The astronomer's telegram

License
Unspecified

Link to publication

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
VLBI localization of FRB 20201124A and absence of persistent emission on milliarcsecond scales

ATel #14603: B. Marcote (JIVE), F. Kirsten (Chalmers/OSO), J. W. T. Hessels (ASTRON, U. of Amsterdam), K. Nimmo (ASTRON, U. of Amsterdam), A. Keimpema (JIVE), Z. Paragi (JIVE), U. Bach (MPIfR), M. Burgay (INAF OA-Cagliari), A. Corongiu (INAF OA-Cagliari), R. Feller (NCU, Torun), O. Forssén @n (Chalmers/OSO), M. Gawronski (NCU, Torun), M. Giroletti (INAF/IRA), A. Gopinath (U. of Amsterdam), D. M. Hewitt (U. of Amsterdam), R. Karuppusamy (MPIfR), M. Kramer (MPIfR), O. S. Ould-Boukattine (U. of Amsterdam), M. Pilia (INAF OA-Cagliari), M. P. Snedlers (U. of Amsterdam), L. Spitler (MPIfR), G. Surcis (INAF OA-Cagliari), M. Trudu (INAF OA-Cagliari), J. Yang (Chalmers/OSO)

on 5 May 2021; 18:24 UT

Credential Certification: Benito Marcote (marcote@jive.eu)

Subjects: Radio, Fast Radio Burst

Referred to by ATel #: 14836, 14933

Tweet

We observed the field of FRB 20201124A (ATel #14497) as part of the PRECISE project with an ad-hoc interferometric array composed of dishes that are part of the European VLBI Network (EVN). We detected bursts in two epochs recorded on 10 April 2021 15:00-21:15UT (with six antennas: Onsala, Torun, Irbene, Westerbork, Noto, and Effelsberg; EVN project code EK048D, PRECISE project code PR153A) and on 19 April 2021 13:30-19:30UT (with nine antennas: Onsala, Torun, Irbene, Westerbork, Medicina, Svetloe, Badary, Sardinia, and Effelsberg; EVN project code EK048E, PRECISE project code PR156A) at a central frequency of 1.374 GHz and with bandwidths ranging from 128-256 MHz (depending on the antenna). J0502+2516 was used as a phase calibrator in a phase-referencing cycle of 4.5 min on target and 1.5 min on the calibrator.

We detected 13 bursts from FRB 20201124A in EK048D, which allowed us to localize the burst source, in a preliminary analysis, to the following position:

RA (J2000) = 05h08m03.5077s
DEC (J2000) = 26d03'38.504"

Related
15286 A bright burst detected at 2 GHz from the repeating FRB 20201124A
15197 Detection of two bright bursts from FRB20201124A with Apertif at the Westerbork Synthesis Radio Telescope.
15198 ASKAP low-band interferometric localisation of the FRB 20201124A source
15196 Detection of three more bursts from FRB 20201124A using the Westerbork-RT1 25-m telescope
15199 Burst detection from FRB 20201124A using the Westerbork-RT1 25-m telescope
15152 Recent outbursts from Cygnus X-3 observed with the Nasu telescope array at 1.4GHz
14989 Detection of a new outburst from Cygnus X-3 with the Nasu telescope array at 1.4GHz
14933 Detection of 9 new bursts from FRB20201124A with the 100 m Effelsberg Telescope
14993 Detection of 9 new bursts from FRB20201124A with the 100 m Effelsberg Telescope
14843 Detection of a persistent radio source at the location of FRB20201124A with VLA
14592 ASKAP low-band interferometric localisation of the FRB 20201124A source
14556 Extremely bright pulse from FRB20201124A observed with the 25-m Stockert Radio Telescope
14540 Detection of a persistent radio source at the location of FRB20201124A with VLA
14533 uGMRT localization of FRB20201124A
14537 Radio observations of FRB20201124A at 4-8 GHz with the 100-m Effelsberg Radio Telescope
14532 MASTER follow-up optical observation of FRB20201124A
14529 uGMRT detection of a persistent radio source coincident with FRB20201124A
14526 VLA/realfast localization and deep imaging of FRB 20201124A

https://www.astronomerstelegram.org/?read=14603[1-4-2022 16:17:34]
with an estimated uncertainty of about 4 milliarcseconds (mas) in each direction, dominated by signal-to-noise limitations. Any additional systematic shifts on the position are likely less than ~2 mas. The synthesized beam is 40 mas x 18.3 mas (PA = 50 deg).

We note that this position is consistent with the localizations previously reported by ASKAP (ATel #14592), FAST (ATel #14518), VLA/realfast (ATel #14526), and uGMRT (ATel #14538).

Combining the data from the two observations, we produced a deep continuum radio image of the field with an rms noise level of 12 uJy/beam. No persistent emission above a 6-sigma confidence level is reported in an area of 10 x 10 arcsec. Given the shortest baseline in the array (Effelsberg-Westerbork; ~270 km), any emission on angular scales larger than >~140 mas is resolved out. This corresponds to a transverse size of >~260 pc at the redshift of the proposed host galaxy (z ~ 0.098; ATel #14516). Thus, the persistent emission detected on arcsec scales by the VLA (ATel #14549) and the GMRT (ATel #14529) must be of extended nature.

Five additional bursts were detected in EK048E and they are still under analysis. These results, together with a final analysis, will be presented in a forthcoming paper.

We thank the staff of all the EVN telescopes for operating these observations outside standard sessions. The European VLBI Network is a joint facility of independent European, African, Asian, and North American radio astronomy institutes. Scientific results from data presented in this publication are derived from the following EVN project code: EK048. These data have been correlated using the SFXC software correlator at JIVE (The Netherlands).

**Figure with the burst localization and the continuum map.**

[Telegram Index]

R. E. Rutledge, Editor-in-Chief

Derek Fox, Editor

rrutledge@astronomerstelegram.org
dfox@astronomerstelegram.org

https://www.astronomerstelegram.org/?read=14603[1-4-2022 16:17:34]