

Late-time radio brightening and emergence of a radio jet in the changing-look AGN 1ES 1927+654

EILEEN T. MEYER,¹ SIBASISH LAHA,^{2,3,4} ONIC I. SHUVO,¹ AGNIVA ROYCHOWDHURY,^{5,1} DAVID A. GREEN,⁶
LAUREN RHODES,⁷ AMELIA M. HANKLA,^{8,9,*} ALEXANDER PHILIPPOV,¹⁰ ROSTOM MBAREK,^{8,9,*} ARI LAOR,¹¹
MITCHELL C. BEGELMAN,¹² DEV R. SADAULA,^{2,3,4} RITESH GHOSH,^{3,2,4,13} GABRIELE BRUNI,¹⁴ FRANCESCA PANESSA,¹⁴
MATTEO GUAINAZZI,¹⁵ EHUD BEHAR,^{11,16} MEGAN MASTERSON,¹⁶ HAOCHENG ZHANG,^{3,2} XIAOLONG YANG,¹⁷
MARK A. GURWELL,¹⁸ GARRETT K. KEATING,¹⁹ DAVID WILLIAMS-BALDWIN,²⁰ JUSTIN D. BRAY,²⁰
EMMANUEL K. BEMPONG-MANFUL,^{20,21} NICHOLAS WRIGLEY,²⁰ STEFANO BIANCHI,²² FEDERICA RICCI,^{22,23}
FABIO LA FRANCA,²² ERIN KARA,¹⁶ MARKOS GEORGANOPOULOS,¹ SAMANTHA OATES,²⁴ MATT NICHOLL,²⁵ MAIN PAL,²⁶
AND S. BRADLEY CENKO^{2,27}

¹Department of Physics, University of Maryland Baltimore County, 1000 Hilltop Circle Baltimore, MD 21250, USA

²Astrophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA.

³Center for Space Science and Technology, University of Maryland Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250, USA.

⁴Center for Research and Exploration in Space Science and Technology, NASA/GSFC, Greenbelt, Maryland 20771, USA

⁵Space Telescope Science Institute, 3700 San Martin Dr, Baltimore, MD 21218, USA

⁶Astrophysics Group, Cavendish Laboratory, 19 J.J. Thomson Avenue, Cambridge CB3 0HE, UK

⁷Astrophysics, The University of Oxford, Keble Road, Oxford OX1 3RH, UK

⁸Joint Space-Science Institute, University of Maryland, College Park, MD 20742, USA

⁹Department of Astronomy, University of Maryland, College Park, MD, USA

¹⁰Department of Physics, University of Maryland, College Park, MD 20742, USA

¹¹Department of Physics, Technion, Haifa 32000, Israel

¹²JILA, University of Colorado and National Institute of Standards and Technology, 440 UCB, Boulder, CO 80309-0440, USA.

¹³MKHS, Murshidabad, West Bengal, 742401, India.

¹⁴INAF – Istituto di Astrofisica e Planetologia Spaziali, Via del Fosso del Cavaliere 100, Roma, 00133, Italy

¹⁵European Space Agency (ESA), European Space Research and Technology Centre (ESTEC), Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands

¹⁶Department of Physics & Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

¹⁷Shanghai Astronomical Observatory, CAS, 80 Nandan Road, Shanghai 200030, China

¹⁸Center for Astrophysics | Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA

¹⁹Center for Astrophysics | Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138 USA

²⁰Jodrell Bank Centre for Astrophysics, Department of Physics and Astronomy, The University of Manchester, Manchester M13 9PL, UK

²¹School of Physics, University of Bristol, Tyndall Avenue, Bristol BS8 1TL, UK

²²Dipartimento di Matematica e Fisica, Università degli Studi Roma Tre, via della Vasca Navale 84, I-00146 Roma, Italy

²³INAF-Osservatorio Astronomico di Roma, via Frascati 33, 00040 Monteporzio Catone, Italy

²⁴Birmingham Institute for Gravitational Wave Astronomy and School of Physics and Astronomy, University of Birmingham, Birmingham B15 2TT, UK

²⁵Astrophysics Research Centre, School of Mathematics and Physics, Queens University Belfast, Belfast BT7 1NN, UK

²⁶Department of Physics, Sri Venkateswara College, University of Delhi, Benito Juarez Road, Dhaula Kuan, New Delhi – 110021, India

²⁷Joint Space-Science Institute, University of Maryland, College Park, MD 20742, USA

(Received October 15, 2024)

ABSTRACT

We present multi-frequency (5–345 GHz) and multi-resolution radio observations of 1ES 1927+654, widely considered one of the most unusual and extreme changing-look active galactic nuclei (CL-AGN). The source was first designated a CL-AGN after an optical outburst in late 2017 and has since displayed considerable changes in X-ray emission, including the destruction and rebuilding of the X-ray corona in 2019–2020. Radio observations prior to 2023 show a faint and compact radio source typical of radio-quiet AGN. Starting in February 2023, 1ES 1927+654 began exhibiting a radio flare with a steep exponential rise, reaching a peak 60 times previous flux levels, and has maintained this higher level of radio emission for over a year to date. The 5–23 GHz spectrum is broadly similar to gigahertz-peaked radio sources, which are understood to be young radio jets less than ~ 1000 years old. Recent