Professor Matt Nicholl

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Interests and expertise

Astrophysics of transient sources; extreme/luminous supernovae; tidal disruption events, quasi-periodic eruptions, and supermassive black hole accretion; kilonovae and multi-messenger astronomy; rapidly evolving transients; transient host galaxies; time-domain surveys; optical, near-infrared, UV and X-ray observations; optical spectroscopy; semi-analytic light curve modelling; machine learning

Appointments

2023–	Reader / Professor (from 2026) · *Queen's University Belfast*
2019–2023	Lecturer / Associate Professor · *University of Birmingham*
2018–2019	Royal Astronomical Society Research Fellow · *University of Edinburgh*
2015–2018	Postdoctoral Research Fellow · *Harvard-Smithsonian Center for Astrophysics*

Education and Qualifications

2020–2022	PGCHE (Distinction) · *University of Birmingham*
2012–2015	PhD, Astrophysics · *Queen's University Belfast*
2008–2012	MPhys (First Class), Physics · *University of Oxford*

Awards and major personal grants

2027-2032	STFC Large Award (PI) · £4.4m
2026-2029	STFC Small Award (PI) · £0.5m
2025	European Astronomical Society MERAC Prize
2022	Fowler Award of the Royal Astronomical Society
2021–2022	Turing Fellowship, The Alan Turing Institute
2021–2026	European Research Council Starting Grant · €1.5m
2016	RAS Michael Penston Prize · For best UK thesis in astronomy or astrophysics

Bibliometrics

- *All papers*: **287** · *Citations*: **>24000** · *H-index*: **70** · Full publication list
- *Lead author*: **25** · *Citations*: **>2900** · *H-index*: **23**

Observing programs and collaborations

Since 2017 I have obtained ∼**500 hours** of PI Observing time on major facilities at all wavelengths, including multiple programs (**standard** and **Target of Opportunity**) with world-class facilities such as *HST*, *Chandra*, VLT, VLA, Gemini, SOAR, *Swift* and LT

I am currently a full member of the ATLAS, Pan-STARRS and LS4 (**wide-field** optical time-domain surveys) and ePESSTO+, 4MOST/TiDES, SoXS and RISOTTO (**spectroscopic** follow-up) collaborations, and an invited external member of ZTF. I lead science working groups in many of these (see Professional Responsibilities). I have full Rubin Observatory LSST data rights as a LSST:UK Affiliate PI

Talks and seminars

I have given > 70 conference talks and colloquia around the world. About half of these are invited talks, including **plenary talks** at some of the largest astrophysics conferences, e.g. the European Astronomical Society annual meeting and International Cosmic Rays Conference

Selected professional responsibilities

Scientific leadership

2027–	PI of TRANSCEND (STFC Large Award)
2026–	Leader of TiDES rare transients working group
2024–	Leader of SoXS Fast and Luminous transients working group
2023–	Coordinator of LS4 survey Massive Black Hole working group
2023–	ATLAS and Pan-STARRS transients groups builder status
2022–	UK representative for CASTOR space telescope time-domain working group
2020–	Leader of ePESSTO+ superluminous supernova science group

Management and contributions to research environment

2026–	Co-Chair, Gender and EDI committee, QUB School of Maths & Physics
2025–	Astronomical Society of Ireland committee member
2024–	Pastoral Support Coordinator, QUB LINAS Doctoral Training Centre
2023–	Elected member of LSST:UK Executive Committee
2021–2023	Director, University of Birmingham Observatory

Contributions to the wider scientific community

2024–	STFC Astronomy Grants Panel member
2020–	Reviewer for STFC, ERC and NASA grants
2016–	Reviewer/panellist for JWST, Gemini, HST, Liverpool Telescope TACs
2014–	Referee for ApJ, MNRAS, A&A, PRD, Nature, Nature Astronomy, Science

Current and graduated PhD students

2026–	Kritika Halder
2025–	Adam Smith
2024–	Dylan Magill
2023–2026	Josh Weston
2022–2026	Paige Ramsden
2023–2025	Thomas Moore (now STScI)
2021–2025	Xinyue Sheng (now QUB postdoc)
2021–2025	Aysha Aamer (now U Arizona)
2020–2025	Evan Ridley

Selected teaching

2024–	Cosmology (Year 4), QUB · lecturer / module coordinator

2023–	Database & Programming Fundamentals (PGT), QUB · lecturer / module coordinator
2020–2023	Observatory Laboratory (Year 3), UoB · module lead
2020–2022	Personal academic tutorials (Year 1), UoB
2019–	MSci projects (Year 4), UoB/QUB · supervised 15+ research students

Open Source Software

- Modular Open Source Fitter for Transients (MOSFiT) · the first open source Bayesian code for physical modelling of transient light curves, widely used in the community for many years. One of the original developers, and lead maintainer since 2019 (Guillochon, Nicholl et al., 2018)
- SuperBol · Popular code for making bolometric light curves from unevenly-sampled multi-band photometry (Nicholl 2018)
- Photometry Sans Frustration (PSF) · Flexible and interactive Python code for PSF and aperture photometry, including image subtraction and zero point calibration (Nicholl et al., 2023)
- Kilonova model library · Grid of semi-analytic kilonova models based on initial binary properties (Nicholl et al., 2021)

Public outreach and media highlights

- Lead organiser for QUB Girls in Maths and Physics (2026), an outreach event with schools bringing over 200 girls aged 12-16 to a day of activities at QUB
- My press releases have appeared in BBC, New York Times, The Independent, The Times, NBC, CBC, Scientific American ++
- I regularly provide expert comment in the media, e.g. 5+ contributions to New Scientist
- TV appearances include BBC The Sky at Night, BBC Midlands Today, ITV News and SFI 'Curious Minds' children's show
- Regular speaker at astronomical society meetings, including keynote speaker at UK Federation of Astronomical Societies annual Convention (Nov 2021) and British Astronomical Association annual residential weekend (Apr 2023)
- Keynote speaker at the 2019 Northern Ireland Physics teachers annual conference

Personal references

- Prof. Andy Lawrence · University of Edinburgh · Fellowship advisor
- Prof. Edo Berger · Harvard University · Postdoc advisor
- Prof. Stephen Smartt · Queen's University Belfast · PhD supervisor
- Prof. Brian Metzger · Columbia University · Collaborator
- Prof. Mark Sullivan · University of Southampton · Collaborator
- Prof. Nial Tanvir · University of Leicester · Collaborator
- Prof. Stefano Benetti · Osservatorio Astronomico di Padova · Collaborator

Selected publications

First author publications

[1] Superluminous supernovae: diverse rise times explain diverse spectra
Nicholl, M., 2026, A&SS, 371, 6 (invited)

[2] Electromagnetic follow-up of gravitational waves: review and lessons learned
Nicholl, M.& Andreoni, I., 2025, PTRSA, 383, 20240126 (invited review)

[3] Quasi-periodic X-ray eruptions years after a nearby tidal disruption event
Nicholl, M., Pasham, D. R., Mummery, A., *et al*., 2024, Nature, 634, 804

[4] AT2022aedm and a new class of luminous, fast-cooling transients in elliptical galaxies
Nicholl, M., Srivastav, S., Fulton, M. D., *et al*., 2023, ApJL, 954, 28

[5] Systematic light curve modelling of TDEs: statistical differences between the spectroscopic classes
Nicholl, M., Lanning, D., Ramsden, P., *et al*., 2022, MNRAS, 515, 5604

[6] Superluminous supernovae: an explosive decade
Nicholl, M., 2021, Astronomy & Geophysics, 62, 34 (invited review)

[7] Tight multi-messenger constraints on the neutron star equation of state from GW170817 and a forward model for kilonova light curve synthesis
Nicholl, M., Margalit, B., Schmidt, P., *et al*., 2021, MNRAS, 505, 3016

[8] An outflow powers the optical rise of the nearby, fast-evolving tidal disruption event AT2019qiz
Nicholl, M., Wevers, T., Oates, S. R., *et al*., 2020, MNRAS, 499, 482

[9] An extremely energetic supernova from a very massive star in a dense medium
Nicholl, M., Blanchard, P. K.; Berger, E., *et al*., 2020, Nature Astronomy, 4, 893

[10] The tidal disruption event AT2017eqx: spectroscopic evolution from hydrogen rich to poor suggests an atmosphere and outflow
Nicholl, M., Blanchard, P. K., Berger, E., *et al*., 2019, MNRAS, 488, 1878

[11] Nebular-phase spectra of superluminous supernovae: physical insights from observational and statistical properties
Nicholl, M., Berger, E., Blanchard, P. K., *et al*., 2019, ApJ, 871, 102

[12] One Thousand Days of SN2015bn: HST Imaging Shows a Light Curve Flattening Consistent with Magnetar Predictions
Nicholl, M., Blanchard, P. K., Berger, E., *et al*., 2018, ApJL, 866, L24

[13] SuperBol: A User-friendly Python Routine for Bolometric Light Curves
Nicholl, M., 2018, RNAAS, 2, 230

[14] The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. III. Optical and UV Spectra of a Blue Kilonova From Fast Polar Ejecta
Nicholl, M., Berger, E., Kasen, D. *et al*., 2017, ApJL, 848, L18

[15] The magnetar model for Type I superluminous supernovae I: Bayesian analysis of the full multi-colour light curve sample with MOSFiT
Nicholl, M., Guillochon, J., Berger, E., 2017, ApJ, 850, 55

[16] The Superluminous Supernova SN 2017egm in the Nearby Galaxy NGC 3191: A Metal-rich Environment Can Support a Typical SLSN Evolution
Nicholl, M., Berger, E., Margutti, R., *et al.*, 2017, ApJL, 845, L8

[17] Empirical constraints on the origin of fast radio bursts: volumetric rates and host galaxy demographics as a test of millisecond magnetar connection
Nicholl, M., Williams, P. K. G., Berger, E., *et al.*, 2017, ApJ, 843, 84

[18] An Ultraviolet Excess in the Superluminous Supernova Gaia16apd Reveals a Powerful Central Engine
Nicholl, M., Berger, E., Margutti, R., *et al.*, 2017, ApJL, 835, L8

[19] Superluminous supernova 2015bn in the nebular phase: evidence for the engine-powered explosion of a stripped massive star
Nicholl, M., Berger, E., Margutti, R., *et al.*, 2016, ApJL, 828, L18

[20] SN 2015BN: A Detailed Multi-wavelength View of a Nearby Superluminous Supernova
Nicholl, M., Berger, E., Smartt, S. J., *et al.*, 2016, ApJ, 826, 39

[21] Seeing double: the frequency and detectability of double-peaked superluminous supernova light curves
Nicholl, M. & Smartt, S. J., 2016, MNRAS Letters, 457, 79

[22] On the diversity of superluminous supernovae: ejected mass as the dominant factor
Nicholl, M., Smartt, S. J., Jerkstrand, A., *et al.*, 2015, MNRAS, 452, 3869

[23] LSQ14bdq: A Type Ic Super-luminous Supernova with a Double-peaked Light Curve
Nicholl, M., Smartt, S. J., Jerkstrand, A., *et al.*, 2015, ApJL, 807, 18

[24] Superluminous supernovae from PESSTO
Nicholl, M., Smartt, S. J., Jerkstrand, A., *et al.*, 2014, MNRAS, 444, 2096

[25] Slowly fading super-luminous supernovae that are not pair-instability explosions
Nicholl, M., Smartt, S. J., Jerkstrand, A., *et al.*, 2013, Nature, 502, 346

Second or supervising author

[26] Automatically distinguishing Rubin transients from AGN using variability metrics
Magill, D., *et al.*, 2026, MNRAS, submitted

[27] AT2025agpz in Rubin commissioning data: distinguishing a luminous interacting supernova from nuclear transients in compact galaxies
Angus, C. R., *et al.*, 2026, MNRAS, submitted

[28] Can tidal disruption event models reliably measure black hole masses?
Angus, C. R., *et al.*, 2026, 550, stag1285

[29] SN 2023taz: Implications for the UV Diversity of Superluminous Supernovae
Aamer, A., *et al.*, 2026, ApJ, 1001, 181

[30] Identifying Transient Hosts in LSST's Deep Drilling Fields with Galaxy Catalogs
Weston, J. G., *et al.*, 2026, ApJ, 1000, 289

[31] An Unexpected Population of Quenched Galaxies Harboring Undermassive SMBHs Revealed by Tidal Disruption Events

Ramsden, P., *et al*., 2026, ApJL, 998, 25

[32] MALLORN: many artificial LSST light curves based on observations of real nuclear transients
Magill, D., *et al*., 2026, RASTI, 5, rzag019

[33] Attention-Based Preprocessing Framework for Improving Rare Transient Classification
Sheng, X., *et al*., 2026, ApJ 1005, 22

[34] The Type I superluminous supernova catalogue – II. Spectroscopic evolution in the photospheric phase, velocity measurements, and constraints on diversity
Aamer, A., *et al*., 2025, MNRAS, 541, 2674

[35] The case of AT2022wtn: a tidal disruption event in an interacting galaxy
Onori, F., *et al*., 2025, MNRAS, 540, 498

[36] Super-SNID: An Expanded Set of SNID Classes and Templates for the New Era of Wide-field Surveys
Magill, D., *et al*., 2025, RNAAS, 9, 78

[37] SN 2023zaw: the low-energy explosion of an ultra-stripped star, with non-radioactive heating
Moore, T., *et al*., 2025, ApJL, 980, 44

[38] Double “acct”: a distinct double-peaked supernova matching pulsational pair-instability models
Angus, C. R., *et al*., 2024, ApJL, 977, 41

[39] The Type I Superluminous Supernova Catalog I: Light Curve Properties, Models, and Catalog Description
Gomez, S., *et al*., 2024, MNRAS, 535, 471

[40] NEural Engine for Discovering Luminous Events (NEEDLE): identifying rare transient candidates in real time from host galaxy images
Sheng, X., *et al*., 2024, ApJL, 531, 2474

[41] Time-varying double-peaked emission lines following the sudden ignition of the dormant galactic nucleus AT2017bcc
Ridley, E., *et al*., 2024, MNRAS, 531, 1905

[42] GW190425: Pan-STARRS and ATLAS coverage of the skymap and limits on optical emission associated with FRB190425
Smartt, S. J., *et al*., 2024, MNRAS, 528, 2299

[43] A Precursor Plateau and Pre-Maximum [O II] Emission in the Superluminous SN2019szu: A Pulsational Pair-Instability Candidate
Aamer, A., *et al*., 2024, MNRAS, 527, 11970

[44] Swift/UVOT discovery of Swift J221951-484240: a UV luminous ambiguous nuclear transient
Oates, S. R., *et al*., 2024, MNRAS, 530, 1688

[45] SN 2022jli: a type Ic supernova with periodic modulation of its light curve and an unusually long rise
Moore, T., *et al*., 2023, ApJL, 956, 31

[46] Unprecedented early flux excess in the hybrid 02es-like type Ia supernova 2022ywc indicates interaction with circumstellar material
Srivastav, S., *et al*., 2023, ApJL, 956, 34

[47] Delayed appearance and evolution of coronal lines in the TDE AT2019qiz
Short, P., *et al*., 2023, MNRAS, 525, 1568

[48] Evidence for a luminosity-decay correlation in GRB GeV light curves
Hinds, K. R., *et al*., 2023, MNRAS, 526, 3400

[49] The Luminosity Function of Tidal Disruption Events from Fallback-powered Emission: Implications for the Black Hole Mass Function
Coughlin, E. R. & **Nicholl, M.**, 2023, ApJL, 948, 22

[50] A multi-messenger model for neutron star - black hole mergers
Gompertz, B. P., *et al*., 2023, MNRAS, 526, 4585

[51] Mechanisms for high spin in black-hole neutron-star binaries and kilonova emission: inheritance and accretion
Steinle, N., *et al*., 2022, MNRAS, 519, 891

[52] A minute-long merger-driven gamma-ray burst from fast-cooling synchrotron emission
Gompertz, B. P., *et al*., 2022, Nature Astronomy, 7, 67

[53] The bulge masses of TDE host galaxies and their scaling with black hole mass
Ramsden, P., *et al*., 2022, MNRAS, 515, 1146

[54] Legacy Survey of Space and Time cadence strategy evaluations for active galactic nucleus time-series data in Wide-Fast-Deep field
Sheng, X., *et al*., 2022, MNRAS, 512, 5580

[55] An elliptical accretion disk following the tidal disruption event AT 2020zso
Wevers, T., *et al*., 2022, A&A, 666, 6

[56] Constraints on compact binary merger evolution from spin-orbit misalignment in gravitational-wave observations
Gompertz, B. P., *et al*., 2021, MNRAS, 511, 1454

[57] Extremely energetic supernova explosions embedded in a massive circumstellar medium: the case of SN 2016aps
Suzuki, A., *et al*., 2020, ApJ, 908, 99

[58] The Tidal Disruption Event AT 2018hyz II: Light-curve modelling of a partially disrupted star
Gomez, S., *et al*., 2019, ApJ, 497, 1925

[59] The tidal disruption event AT 2018hyz: I. Double-peaked emission lines and a flat Balmer decrement
Short, P., *et al*., 2020, MNRAS, 498, 4119

[60] Follow-up of the Neutron Star Bearing Gravitational Wave Candidate Events S190425z and S190426c with MMT and SOAR *
Hosseinzadeh, G., *et al*., 2019, ApJL, 880, L4
* *The first six authors contributed equally to this work*

[61] Bright Type IIP Supernovae in Low-metallicity Galaxies
Scott, S., *et al*., 2018, ApJL, 870, L16

[62] A Hydrogen-Poor Superluminous Supernova with Enhanced Iron-Group Absorption: A New Link Between SLSNe and Broad-Lined Type Ic SNe

Blanchard, P. K., *et al*., 2018, ApJ, 872, 90

[63] Superluminous Supernovae in LSST: Rates, Detection Metrics, and Light Curve Modeling
Villar, V. A., *et al*., 2018, ApJ, 869, 166

[64] MOSFiT: Modular Open-Source Fitter for Transients
Guillochon, J., *et al*., 2018, ApJS, 236, 6

[65] Systematic Investigation of the Fallback Accretion-powered Model for Hydrogen-poor Superluminous Supernovae
Moriya, T., *et al*., 2018, ApJ, 867, 113

[66] The Type I Superluminous Supernova PS16aqv: Lightcurve Complexity and Deep Limits on Radioactive Ejecta in a Fast Event
Blanchard, P. K., *et al*., 2018, ApJ, 865, 9

[67] PS16dtm: A Tidal Disruption Event in a Narrow-line Seyfert 1 Galaxy
Blanchard, P. K., *et al*., 2017, ApJ, 843, 106

[68] Complexity in the light curves and spectra of slow-evolving superluminous supernovae
Inserra, C., *et al*., 2017, Monthly Notices of the Royal Astonomical Society, 468, 4642

[69] The evolution of superluminous supernova LSQ14mo and its interacting host galaxy system
Chen, T.-W., *et al*., 2017, A&A, 602, A9

[70] The supernova CSS121015:004244+132827: a clue for understanding super-luminous supernovae
Benetti, S., *et al*., 2014, MNRAS, 441, 289