nature astronomy

What is Nature Astronomy and how do I get published in it?

Marios Karouzos

Associate Editor

SPRINGER NATURE

What is Nature Astronomy?

The Nature family of journals

Nature (flagship)

launched in 1869
covers natural sciences
covers medicine
covers astronomy
printed & online

Editors:

Leslie Sage (astro)
John VanDecar (geo)
Juliane Mössinger (geo)
Mike White (geo)

The Nature family of journals

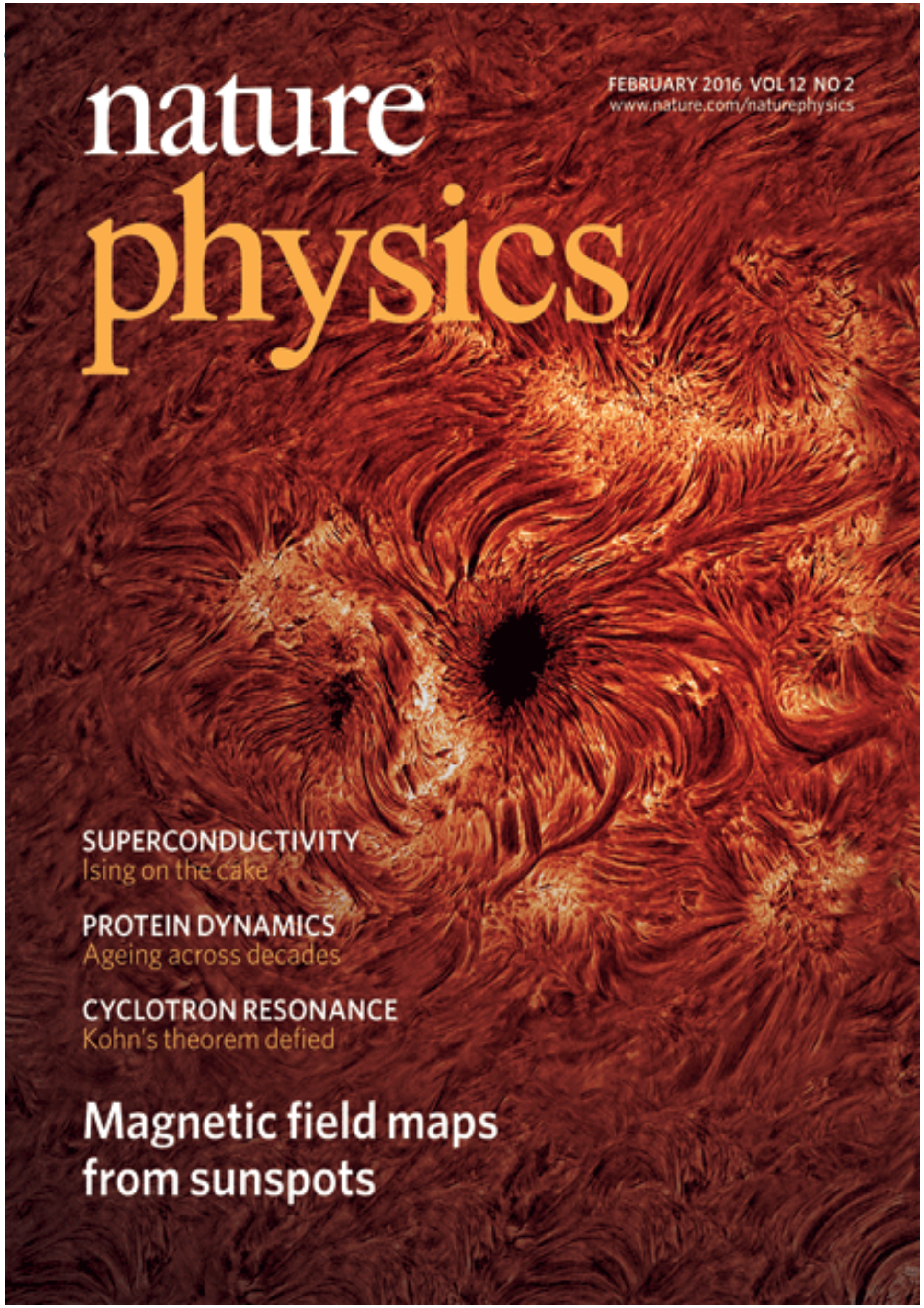
Nature Physics

(research journal)

launched in 2005
covers physics
covers astronomy
covers cosmology
print & online

Editors:

6 full-time (London)
1 full-time (Shanghai)



The Nature family of journals

Nature Geoscience
(research journal)
launched in 2008
covers Earth science
covers planetary science
print & online

Editors:
5 full-time (London)

The Nature family of journals

Nature Communications
(open access journal)

launched in 2011
covers all natural sciences
open access
online only

Editors:

~60, mostly London
just hired an astronomer

The family is growing!

What is Nature Astronomy?

Think Nature just dedicated to astronomy¥astrophysics¥planetology (or, for the planetologists, think Nature Geoscience for astro)

Same editorial process, but “competition” only with other astronomy (+ astrophysics + planetary) papers

Why Nature Astronomy?

Nature receives many more excellent astronomy papers than can be published (~90% rejection rate for astronomy)

A new journal of the Nature family dedicated to publish *(the very best of)* astronomy, astrophysics and planetary science

Inaugural issue – January 2017

nature astronomy

LETTERS

PUBLISHED: 4 JANUARY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0005

The case for electron re-acceleration at galaxy cluster shocks

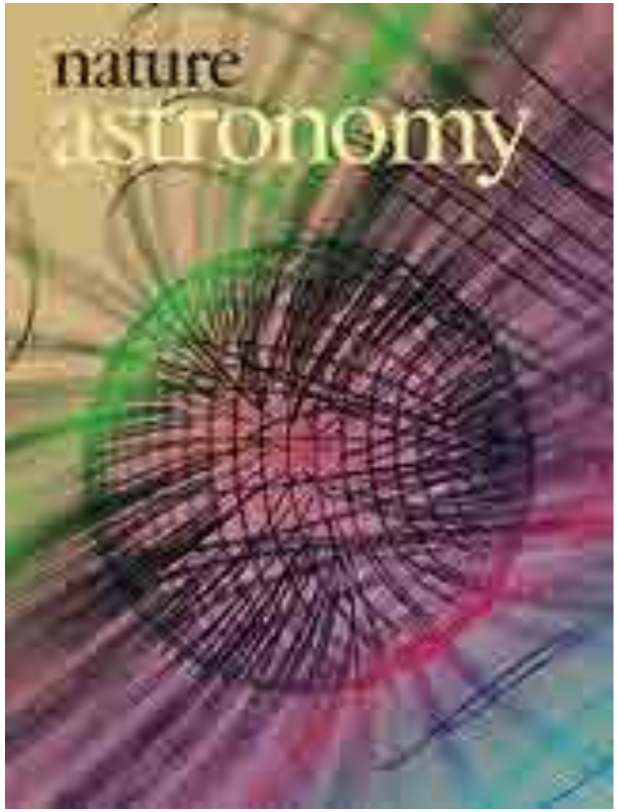
Reinout J. van Weeren[1*], Felipe Andrade-Santos[1], William A. Dawson[2], Nathan Golovich[3], Dharam V. Lal[4], Hyesung Kang[5], Dongsu Ryu[6,7], Marcus Brüggen[8], Georgiana A. Ogrean[9], William R. Forman[1], Christine Jones[1], Vinicius M. Placco[10], Rafael M. Santucci[11], David Wittman[3,12], M. James Jee[13], Ralph P. Kraft[1], David Sobral[14,15], Andra Stroe[16] and Kevin Fogarty[17]

On the largest scales, the Universe consists of voids and filaments making up the cosmic web. Galaxy clusters are located at the knots in this web, at the intersection of filaments. Clusters grow through accretion from these large-scale filaments and by mergers with other clusters and groups. In a growing number of galaxy clusters, elongated Mpc-sized radio sources have been found[1,2]. Also known as radio relics, these regions of diffuse radio emission are thought to trace relativistic electrons in the intracluster plasma accelerated by low-Mach-number shocks generated by cluster-cluster merger events[3]. A long-standing problem is how low-Mach-number shocks can accelerate electrons so efficiently to explain the observed radio relics. Here, we report the discovery of a direct connection between a radio relic and a radio galaxy in the merging galaxy cluster Abell 3411-3412 by combining radio, X-ray and optical observations. This discovery indicates that fossil relativistic electrons from active galactic nuclei are re-accelerated at cluster shocks. It also implies that radio galaxies play an important role in governing the non-thermal component of the intracluster medium in merging clusters.

such high-β plasmas is poorly understood, as analytical calculations cannot properly capture the non-linear behavior of this process[3]. Radio relics, elongated sources that trace the CR at ICM shocks, provide us with rare opportunities to probe this process. While there is substantial evidence that relics trace CR electrons at shocks[6,7], previous work has found that the acceleration efficiency should be very low at these shocks, if these synchrotron emitting electrons are accelerated from the thermal pool of the ICM via the diffusive shock acceleration (DSA) mechanism[5]. This low efficiency is hard to reconcile with the observed brightness of some radio relics, suggesting a high acceleration efficiency[8–10]. In addition, some relics have regions with rather flat radio spectra ($\alpha \approx -0.7$; $F_\nu \propto \nu^\alpha$, where α is the spectral index, F_ν the flux density, and ν the frequency), but the corresponding Mach numbers for the shocks, as measured via X-ray observations, are low[11,12]. This contradicts predictions based on the DSA mechanism[13]. This long-standing problem has so far remained unsolved. Furthermore, large merger shocks have been found without corresponding radio relics[14], indicating that our understanding of particle acceleration by low-Mach-number shocks is still incomplete.

Recently, new insights into the phenomenon have been obtained

February 2017



nature astronomy

LETTERS

PUBLISHED: 30 JANUARY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0036

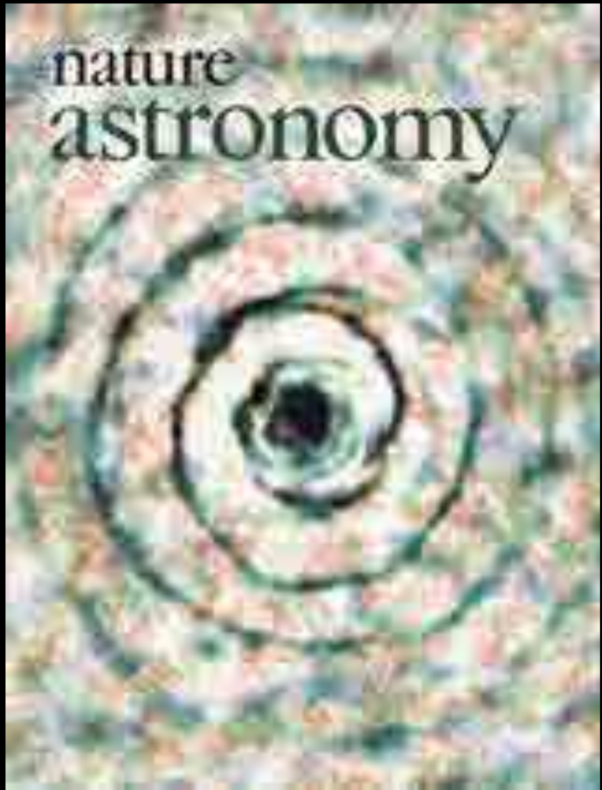
The dipole repeller

Yehuda Hoffman[1]*, Daniel Pomarède[2], R. Brent Tully[3] and Hélène M. Courtois[4]

Our Local Group of galaxies is moving with respect to the cosmic microwave background (CMB) with a velocity[1] of $V_{CMB} = 631 \pm 20\,km\,s^{-1}$ and participates in a bulk flow that extends out to distances of ~20,000 km s^{-1} or more[2-4]. There has been an implicit assumption that overabundances of galaxies induce the Local Group motion[5-7]. Yet underdense regions push as much as overdensities attract[8], but they are deficient in light and consequently difficult to chart. It was suggested a decade ago that an underdensity in the northern hemisphere roughly 15,000 km s^{-1} away contributes significantly to the observed flow[9]. We show here that repulsion from an underdensity is important and that the dominant influences causing the observed flow are a single attractor — associated with the Shapley concentration — and a single previously unidentified repeller, which contribute roughly equally to the CMB dipole. The bulk flow is closely anti-aligned with the repeller out to $16{,}000 \pm 4{,}500\,km\,s^{-1}$. This 'dipole repeller' is predicted to be associated with a void in the distribution of galaxies.

gravitational field; hence it constitutes a gradient of a scalar potential. Figure 1 shows the large-scale structure out to a distance of 16,000 km s^{-1} in a plane that contains the Local Group, the Shapley attractor and the dipole repeller. Three different aspects of the flow are depicted: streamlines, the V-web and the velocity potential.

When describing the gravitational dynamics in co-moving coordinates, by which the expansion of the Universe is factored out, underdensities repel and overdensities attract. The velocity field is represented here by means of streamlines (see Methods), the sources and sinks of which are the attractors and repellers of the large-scale structure (see Fig. 1 and the Supplementary Video). Figure 2 shows a 3D visualization of the streamlines in a box of length 40,000 km s^{-1} centred on the Local Group. The streamlines of the left plot of Fig. 2 either converge onto an attractor located roughly at [−12,300, 7,400, −300] km s^{-1} or cross out of the box. The plot uncovers the existence of a repeller at the upper right-hand side of the box — a region from which streamlines diverge. Repellers are best manifested by the antiflow, namely the negative of the velocity field. The right plot of Fig. 2



March 2017

nature astronomy

LETTERS

PUBLISHED: 1 MARCH 2017 | VOLUME: 1 | ARTICLE NUMBER: 0060

The large-scale nebular pattern of a superwind binary in an eccentric orbit

Hyosun Kim[1*], Alfonso Trejo[1], Sheng-Yuan Liu[1], Raghvendra Sahai[2], Ronald E. Taam[1,3], Mark R. Morris[4], Naomi Hirano[1] and I-Ta Hsieh[1]

Preplanetary nebulae and planetary nebulae are evolved, mass-losing stellar objects that show a wide variety of morphologies. Many of these nebulae consist of outer structures that are nearly spherical (spiral/shell/arc/halo) and inner structures that are highly asymmetric (bipolar/multipolar)[1,2]. The coexistence of such geometrically distinct structures is enigmatic because it hints at the simultaneous presence of both wide and close binary interactions, a phenomenon that has been attributed to stellar binary systems with eccentric orbits[3]. Here, we report high-resolution molecular line observations of the circumstellar spiral-shell pattern of AFGL 3068, an asymptotic giant branch star transitioning to the preplanetary nebula phase. The observations clearly reveal that the dynamics of the mass loss is influenced by the presence of an eccentric-orbit binary. This quintessential object opens a window on the nature of deeply embedded binary stars through the circumstellar spiral-shell patterns that reside at distances of several thousand au from the stars.

at the distance of AFGL 3068 (~3,400 ly) in the ^{12}CO $J=2-1$ and ^{13}CO $J=2-1$ molecular lines (see middle panel of Fig. 1; J is the rotational quantum number). The HC_3N $J=24-23$ line best highlights the innermost winding of the spiral pattern. The emission maps integrated over the molecular lines are well correlated with the HST image, thus verifying that the circumstellar dust and molecular gas trace the same spiral feature. Remarkably, the molecular line maps reveal the presence of the innermost winding of the spiral ($r<3''$), which was absent in the dust-scattered light image.

The observed emission pattern follows an approximately straight line when displayed in the radius (r) versus angle (ϕ) plot (Fig. 2). Such a projected shape is markedly similar to an Archimedean spiral to first order. Hydrodynamic models show that a perfect Archimedean spiral pattern forms in the CSE surrounding a mass-losing star in a circular orbit, viewed with the orbital plane located near the plane of the sky[8].

While the molecular line emission near the systemic velocity exhibits a remarkable spiral pattern (Fig. 1, middle row panels), the

April 2017

nature astronomy

LETTERS

PUBLISHED: 13 MARCH 2017 | VOLUME: 1 | ARTICLE NUMBER: 0064

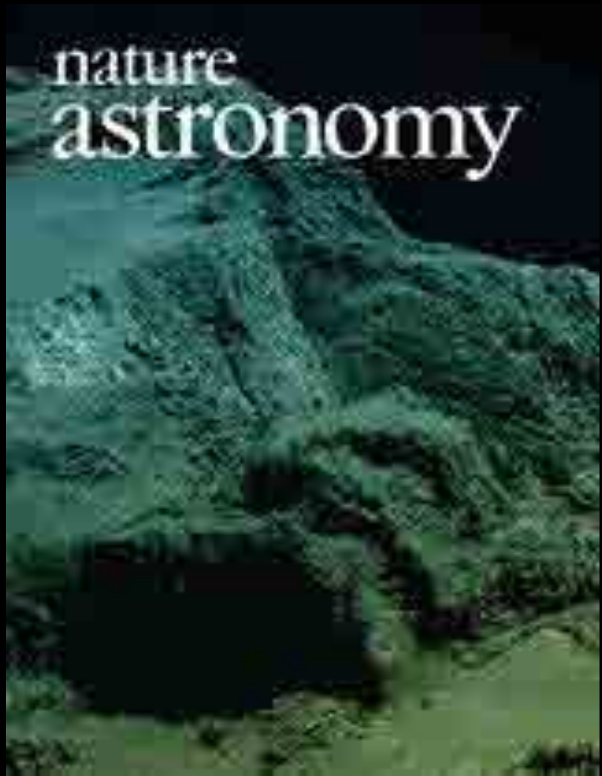
Spin alignment of stars in old open clusters

Enrico Corsaro[1,2,3,4]*, Yueh-Ning Lee[1], Rafael A. García[1], Patrick Hennebelle[1], Savita Mathur[5], Paul G. Beck[1], Stephane Mathis[1], Dennis Stello[6,7] and Jérôme Bouvier[8,9]

Stellar clusters form by gravitational collapse of turbulent molecular clouds, with up to several thousand stars per cluster[1]. They are thought to be the birthplace of most stars and therefore play an important role in our understanding of star formation, a fundamental problem in astrophysics[2,3]. The initial conditions of the molecular cloud establish its dynamical history until the stellar cluster is born. However, the evolution of the cloud's angular momentum during cluster formation is not well understood[4]. Current observations have suggested that turbulence scrambles the angular momentum of the cluster-forming cloud, preventing spin alignment among stars within a cluster[5]. Here we use asteroseismology[6–8] to measure the inclination angles of spin axes in 48 stars from the two old open clusters NGC 6791 and NGC 6819. The stars within each cluster show strong alignment. Three-dimensional hydrodynamical simulations of proto-cluster formation show that at least 50% of the initial proto-cluster kinetic energy has to be rotational in order to obtain strong stellar-spin alignment within a cluster. Our result indicates that the global angular momentum of the cluster-forming clouds was efficiently transferred to each star and that its imprint has survived several gigayears since the clusters formed.

especially for red giant stars[7,8,10,11]. Red giants are typically low- and intermediate-mass stars that have evolved off the main sequence of the stellar evolution. Most red giants oscillate, and their oscillations can be analysed through a Fourier frequency spectrum of their light curve. The spectrum of a red giant contains a comb-like structure of tens and sometimes more than a hundred radial and non-radial oscillation modes, most of which are mixed modes originating from the coupling between acoustic and gravity modes[12]. Each oscillation mode is identified by an angular degree l, which gives rise to a multiplet of $(2l + 1)$ different components through the degeneracy lifted by the stellar rotation[6]. Each rotationally split component is in turn identified by an azimuthal number, $m \leq |l|$. The dipolar ($l = 1$) mixed modes are the most suited for measuring the orientation of the spin axis in red giants[13].

We have investigated 48 oscillating red giant stars with typical masses within the range ~1.1–1.7 $M_\odot$ that belong to the open clusters NGC 6791 and NGC 6819[14–16]. The most relevant physical properties of the two open clusters are outlined in Table 1. Both clusters are old, with NGC 6791 being one of the oldest known in our Galaxy[17], which implies that the initial molecular clouds were massive enough to ensure that the cluster evaporation time — the time it takes for all the members of a cluster to be ejected by inter-



May 2017

nature astronomy

LETTERS

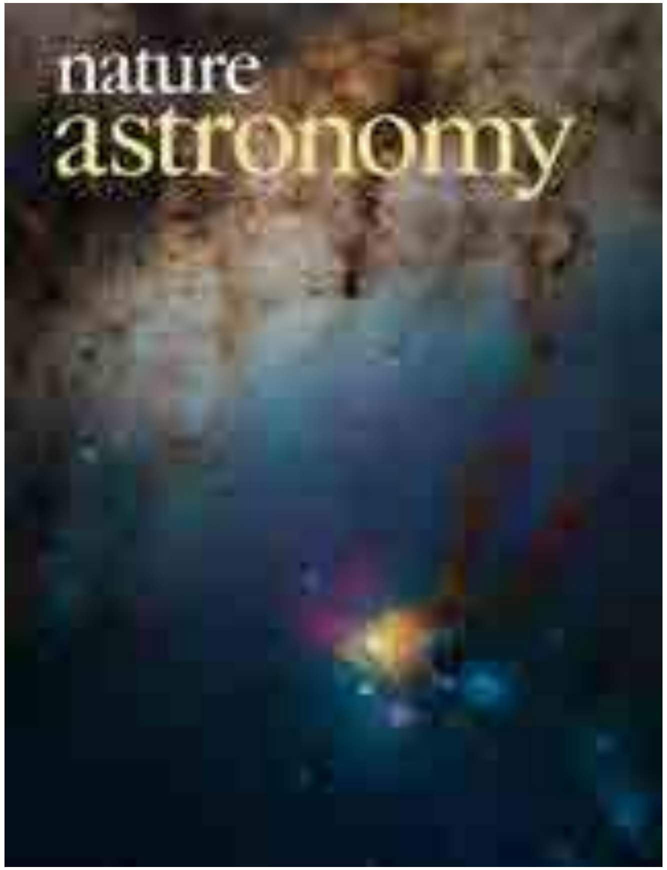
PUBLISHED: 21 MARCH 2017 | VOLUME: 1 | ARTICLE NUMBER: 0092

The pristine interior of comet 67P revealed by the combined Aswan outburst and cliff collapse

M. Pajola[1,2*], S. Höfner[3], J.B. Vincent[3,4], N. Oklay[3,4], F. Scholten[4], F. Preusker[4], S. Mottola[4], G. Naletto[2,5,6], S. Fornasier[7], S. Lowry[8], C. Feller[7], P.H. Hasselmann[7], C. Güttler[3], C. Tubiana[3], H. Sierks[3], C. Barbieri[2,9], P. Lamy[10], R. Rodrigo[11,12], D. Koschny[13], H. Rickman[14,15], H.U. Keller[4,16], J. Agarwal[3], M.F. A'Hearn[17], M.A. Barucci[7], J.-L. Bertaux[18], I. Bertini[2], S. Besse[19], S. Boudreault[3], G. Cremonese[20], V. Da Deppo[6], B. Davidsson[21], S. Debei[22], M. De Cecco[23], J. Deller[3], J.D.P. Deshapriya[7], M.R. El-Maarry[24,25], S. Ferrari[2], F. Ferri[2], M. Fulle[26], O. Groussin[10], P. Gutierrez[27], M. Hofmann[3], S.F. Hviid[4], W.-H. Ip[28,29], L. Jorda[10], J. Knollenberg[4], G. Kovacs[3,30], J.R. Kramm[3], E. Kührt[4], M. Küppers[19], L.M. Lara[27], Z.-Y. Lin[28], M. Lazzarin[9], A. Lucchetti[20], J.J. Lopez Moreno[27], F. Marzari[9], M. Massironi[31], H. Michalik[32], L. Penasa[31], A. Pommerol[24], E. Simioni[6,20], N. Thomas[24], I. Toth[10,33] and E. Baratti[34]

Outbursts occur commonly on comets[1] with different frequencies and scales[2,3]. Despite multiple observations suggesting various triggering processes[4,5], the driving mechanism of such outbursts is still poorly understood. Landslides have been invoked[6] to explain some outbursts on comet 103P/Hartley 2, although the process required a pre-existing dust layer on the verge of failure. The Rosetta mission observed several outbursts from its target comet 67P/Churyumov-Gerasimenko, which were attributed to dust generated by the crumbling of materials from collapsing cliffs[3,8]. However, none of the aforementioned works included definitive evidence that landslides occur on comets. Amongst the many features observed by Rosetta on the nucleus of the comet, one peculiar fracture, 70 m long and 1 m wide, was identified on images obtained in September 2014 at the edge of a cliff named Aswan[9]. On 10 July 2015, the Rosetta Navigation Camera captured a large plume of dust that could be traced back to an area encompassing the Aswan escarpment[7]. Five days later, the OSIRIS camera observed a fresh, sharp and bright edge on the Aswan cliff. Here we report the first unambiguous link between an outburst and a cliff collapse on a comet. We establish a new dust-plume formation mechanism that does not necessarily require the breakup of pressurized crust or the presence of supervolatile material, as suggested by previous studies[7]. Moreover, the collapse revealed the fresh icy interior of the comet, which is characterized by an albedo > 0.4, and provided the opportunity to study how the crumbling wall settled down to form a new talus.

The evolution of the collapse of the Aswan cliff[9], observed by the OSIRIS Narrow Angle Camera (NAC)[10] and the Rosetta Navigation



August 2017

nature astronomy

LETTERS

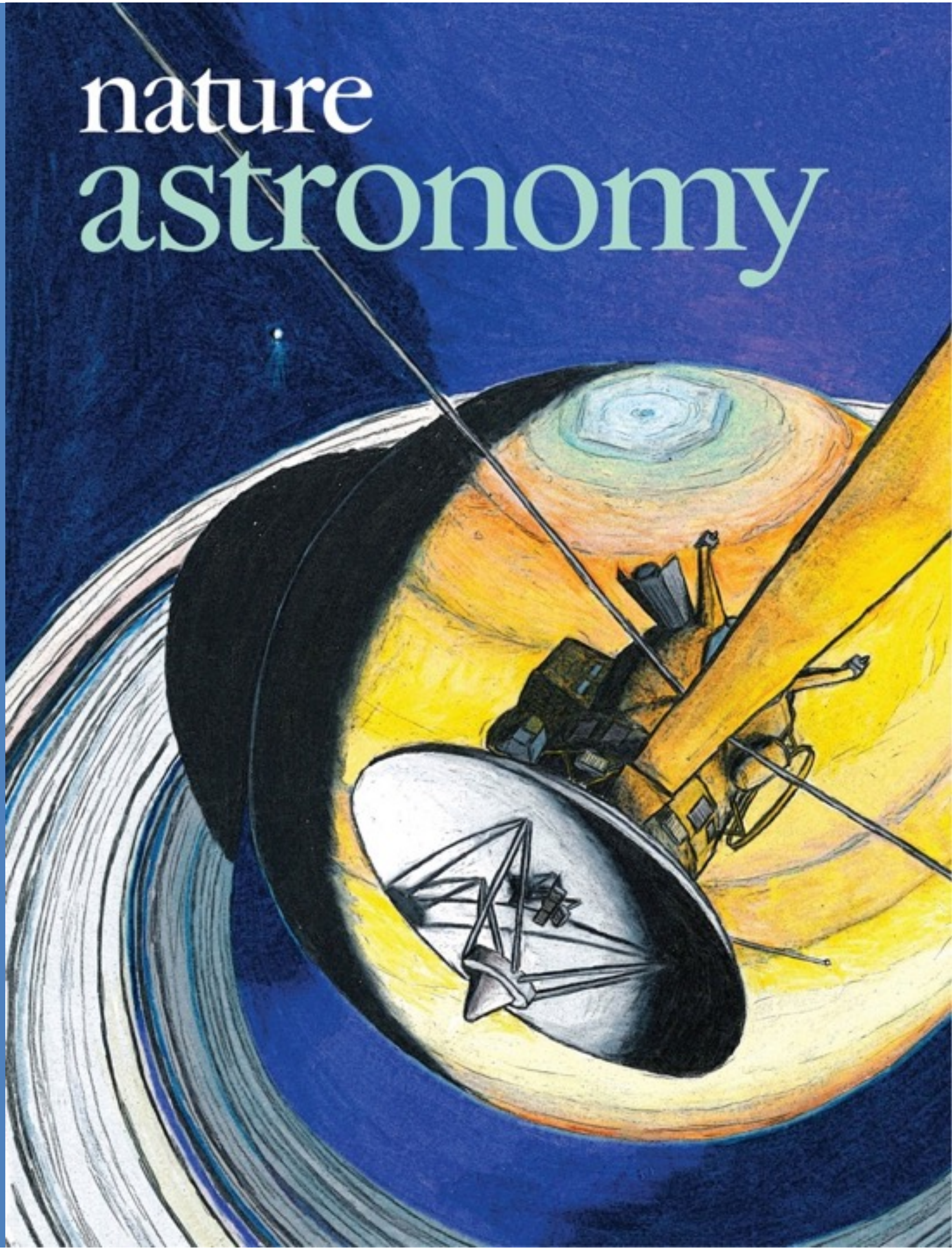
PUBLISHED: 19 JUNE 2017 | VOLUME: 1 | ARTICLE NUMBER: 0158

The link between magnetic field orientations and star formation rates

Hua-bai Li[1]*, Hangjin Jiang[2], Xiaodan Fan[2], Qilao Gu[1] and Yapeng Zhang[1]

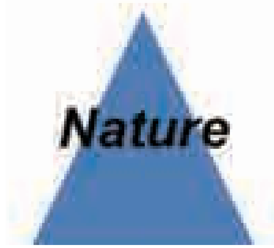
Understanding star formation rates (SFRs) is a central goal of modern star formation models, which mainly involve gravity, turbulence and, in some cases, magnetic fields (B-fields)[1,2]. However, a connection between B-fields and SFRs has never been observed. Here, a comparison between the surveys of SFRs[3,4] and a study of cloud-field alignment[5]—which revealed a bimodal (parallel or perpendicular) alignment—shows consistently lower SFRs per solar mass for clouds almost perpendicular to the B-fields. This is evidence of B-fields being a primary regulator of SFRs. The perpendicular alignment possesses a significantly higher magnetic flux than the parallel alignment and thus a stronger support of the gas against self-gravity. This results in overall lower masses of the fragmented components, which are in agreement with lower SFRs.

assumed[3,4] that the SFR is directly related to the population of young stellar objects in a cloud. The young stellar objects in the Gould Belt have similar ages of 2 ± 1 Myr and the median for the initial stellar mass is around $0.5\,M_{\odot}$ so the SFR of each cloud can be estimated by the number of embedded young stellar objects multiplied by 0.5 $M_{\odot}$ and divided by 2 Myr. We are looking for factors in the SFR other than mass, so here we study the SFR per unit mass (SFR mass^{-1}). Ref. [3] estimates cloud mass from regions above a visual extinction $A_v = 2$ mag, and ref. [4], besides a threshold similar to ref. [3], also used $A_v = 7$ mag. Note that although the Herschel space telescope revealed ubiquitous sub-cloud filamentary density structures[14] where most of the protostars are forming, young stellar objects, on the other hand, do not correlate with these filaments in position[15,16] (see Supplementary Fig. 1). So the resolution of the SFR[3,4], and thus our study of their



Credit: James Tuttle Keane

What is Nature Astronomy?



Within *Nature*…

<u>*Nature* / Nature Research journals</u>

→ highest selectivity and editing added value

<u>Nature Communication</u>

→ highest selectivity for validity and quality

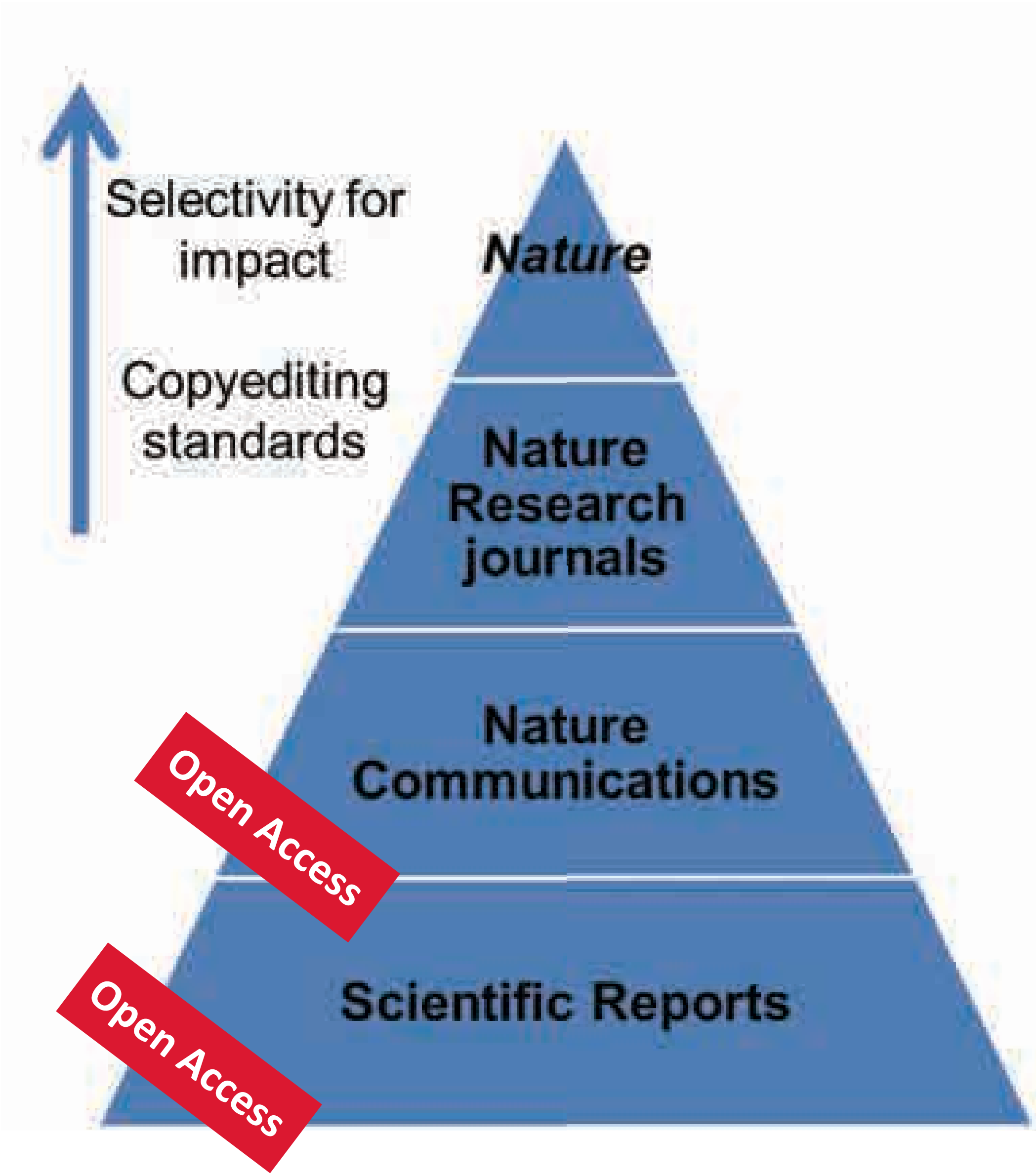
→ lower researcher impact and a reduced level of copyediting

<u>Scientific Reports</u>

→ minimal standards of significance and long-term impact

→ external editorial team

→ no copyediting



Deconstructing the pyramid!

So which journal should I submit to?

Nature, of course, has a strong track record in astronomy...

... But only accepts ~7% of submitted papers

... And has a very broad range of topics, with only one or two Astro papers per issue

... And papers need to be written for a broad audience

... And there are page charges

So which journal should I submit t

Nature, of course, has a strong track record in astronomy…

… Astronomy & Planetary Science were 4th most popular topic in 2016

… The most popular paper in 2016 was on exoplanets (Proxima b)

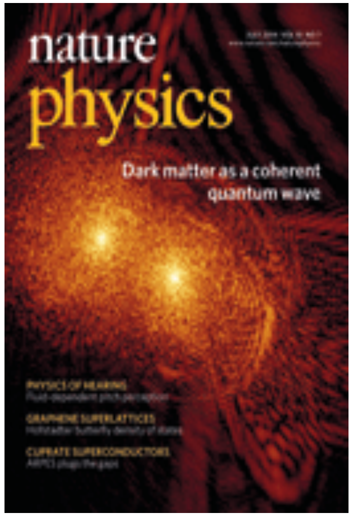
… Nature is very supportive of astronomy content (LS most accepting editor)

… Nature has a very active Press Office

So which journal should I submit to?

Nature Physics **also covers astronomy.** ***Nature Geoscience*** **covers planetary science.**

Nature Communications **takes everything...**



... But Nature Astronomy is now the obvious choice for any astronomer, cosmologist or planetary scientist.

So which journal should I submit to?

Advantages of Nature Astronomy:

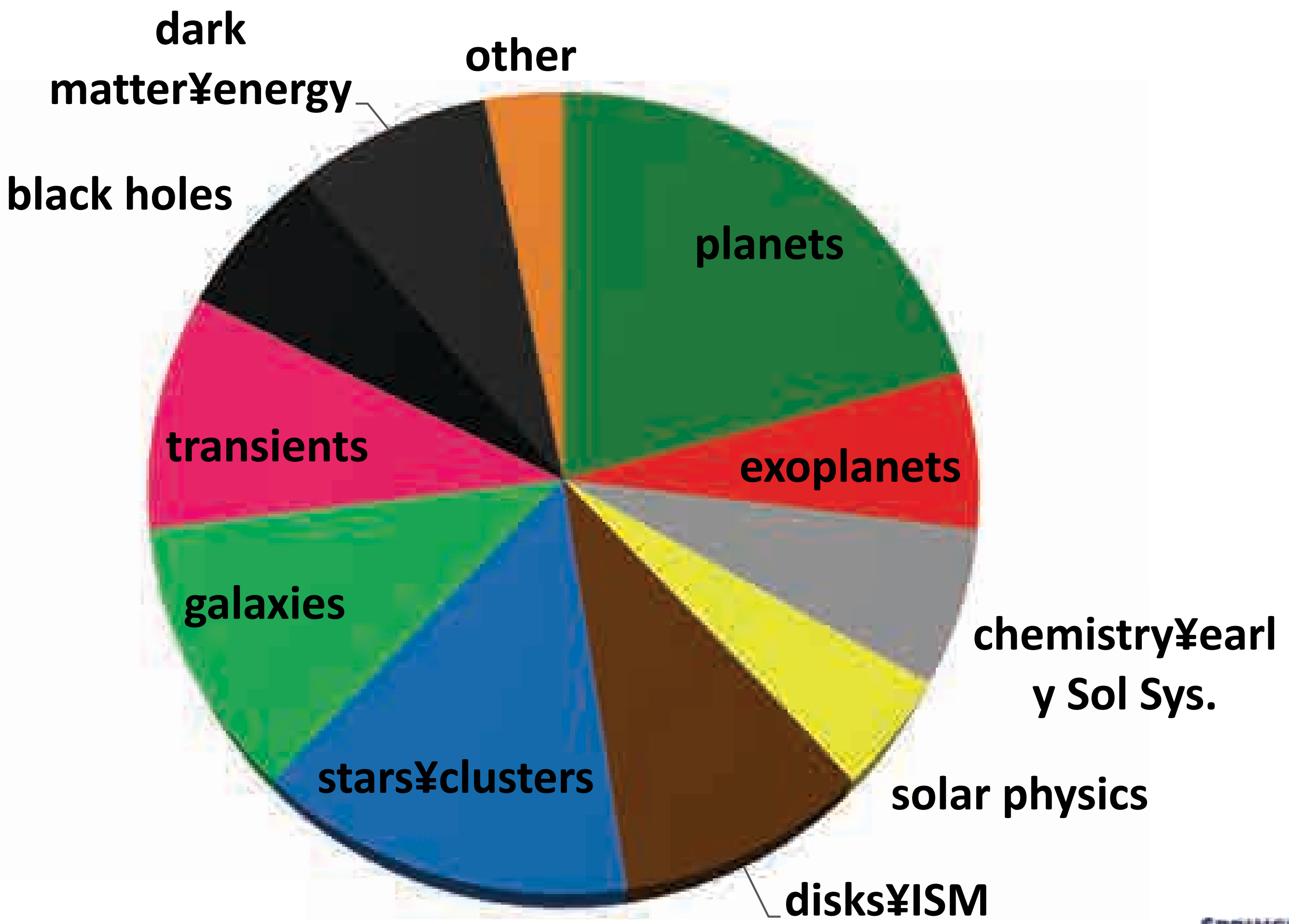
- specialist editors (all former astronomers)
- deals exclusively with astronomy & planetary science communities
- no page charges
- no colour figure charges
- online only
- 21st century media (e.g., videos, GIFs)
- young journal, willing to try new things

Disadvantages of Nature Astronomy:

- not Open Access (at any level) (but arXiv encouraged!)
- unknown impact factor (yet)

What is (the scope of) Nature Astronomy?

- Everything astronomy-related including those parts not usually displayed in Nature (theory, methodology, instrumentation…)



What type of content does Nature Astronomy publish?

→ Letters + Articles (= bread and butter of journal)

Plus commissioned content:

→ Comments, Perspe

→ News & Views idea

→ Book/arts reviews

→ Mission Control (m

→ Focus / Insight top

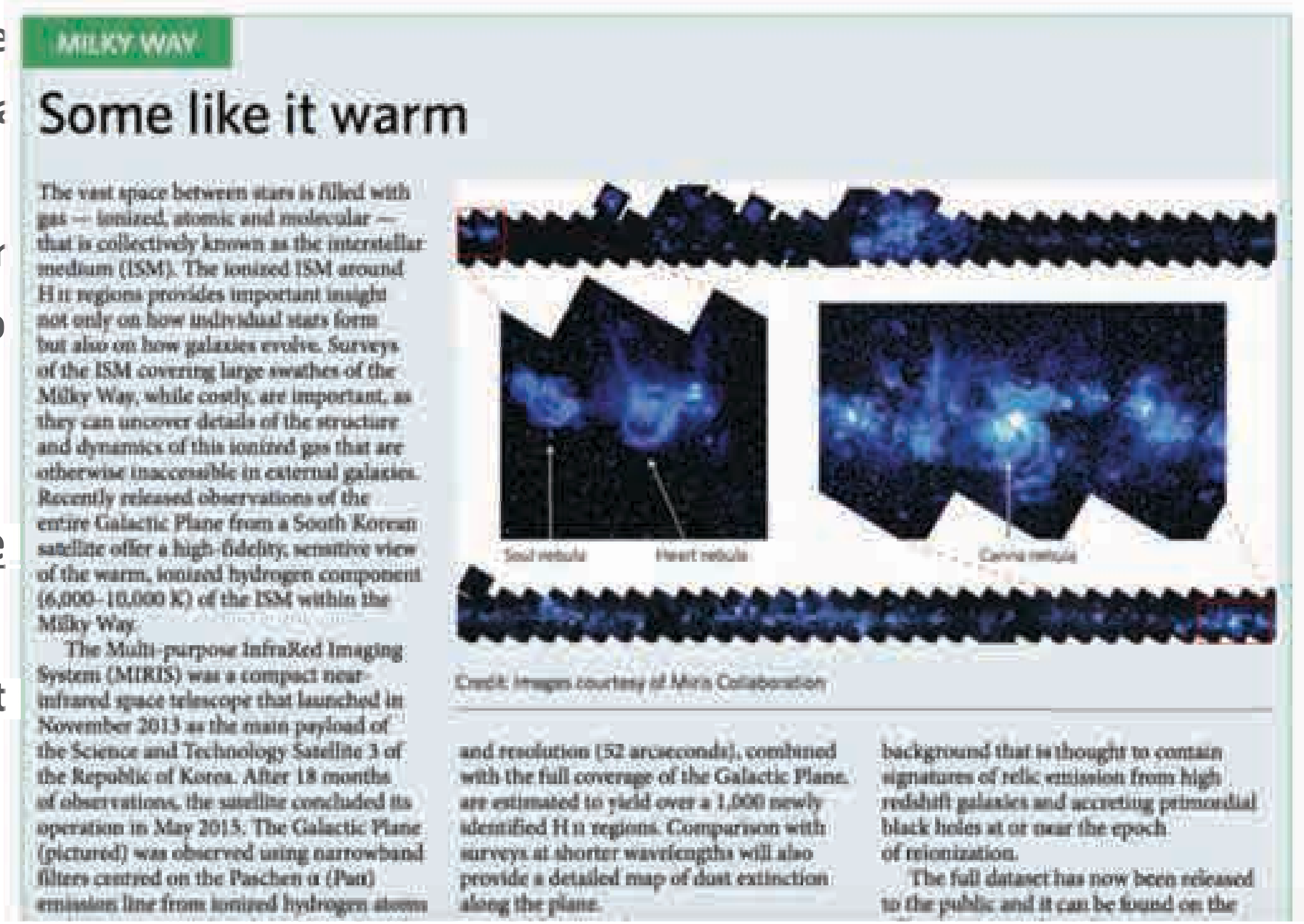
→ Collections

Plus editorial conte

→ Editorial

→ Research Highlight

→ Picture Stories



MILKY WAY

Some like it warm

The vast space between stars is filled with gas — ionized, atomic and molecular — that is collectively known as the interstellar medium (ISM). The ionized ISM around H II regions provides important insight not only on how individual stars form but also on how galaxies evolve. Surveys of the ISM covering large swathes of the Milky Way, while costly, are important, as they can uncover details of the structure and dynamics of this ionized gas that are otherwise inaccessible in external galaxies. Recently released observations of the entire Galactic Plane from a South Korean satellite offer a high-fidelity, sensitive view of the warm, ionized hydrogen component (6,000–10,000 K) of the ISM within the Milky Way.

The Multi-purpose InfraRed Imaging System (MIRIS) was a compact near-infrared space telescope that launched in November 2013 as the main payload of the Science and Technology Satellite 3 of the Republic of Korea. After 18 months of observations, the satellite concluded its operation in May 2015. The Galactic Plane (pictured) was observed using narrowband filters centred on the Paschen α (Paα) emission line from ionized hydrogen atoms

Credit: Images courtesy of Miris Collaboration

and resolution (52 arcseconds), combined with the full coverage of the Galactic Plane, are estimated to yield over a 1,000 newly identified H II regions. Comparison with surveys at shorter wavelengths will also provide a detailed map of dust extinction along the plane.

background that is thought to contain signatures of relic emission from high redshift galaxies and accreting primordial black holes at or near the epoch of reionization.

The full dataset has now been released to the public and it can be found on the

What type of content does Nature Astronomy publish?

PUBLISHED: 2 MAY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0111

news & views

EARLY UNIVERSE

Tiny emissary from afar

The combined power of a space telescope, a large ground-based telescope and a gravitational lens made catching a small galaxy — 1/100 the mass of the Milky Way — at the cosmic reionization epoch feasible.

Nobunari Kashikawa

Today's cutting-edge astronomical telescopes act as time machines that can take us back to the ancient Universe. We can understand the initial stage of galaxy formation by observing the most distant and consequently youngest galaxies. In many cases, however, light from extremely distant galaxies is too faint to detect, therefore limiting us to the study of only the brightest sources[1] in the early Universe. On the other hand, Einstein's general theory of relativity tells us that the large gravitational potential of galaxy clusters allows them to act as natural telescopes, amplifying the light coming from the very distant Universe. In this issue of *Nature Astronomy*, Austin Hoag and collaborators[2] present the discovery of a distant ultra-faint galaxy — at a redshift of 7.640, or only 70 million years after the Big Bang — by combining the most advanced man-made telescopes with the power of gravitational lensing. The discovery is significant for confirming the existence of low-mass and low-luminosity galaxies, which are thought to play a major

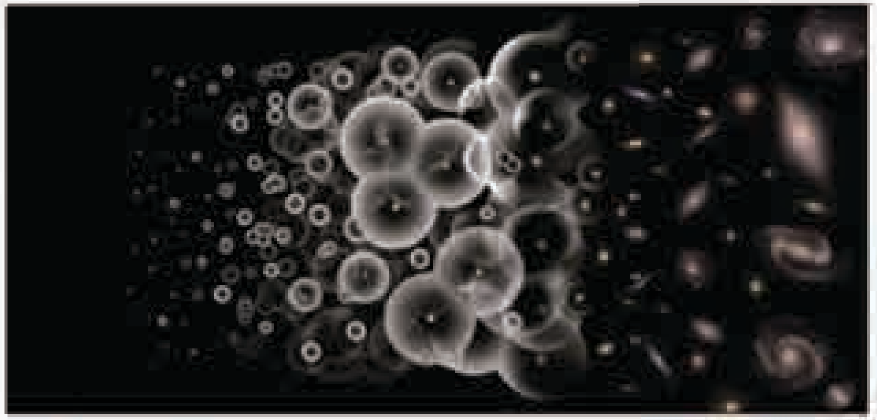


Figure 1 | Schematic diagram of the cosmic reionization epoch. The light from the first generation of galaxies starts to ionize neutral hydrogen around them. The intergalactic gas in the Universe is completely ionized after several hundred million years.

reionization. The Keck spectra suggest the possible presence of triply and quadruply ionized carbon emission lines, redshifted to the near-IR. The available multi-wavelength

when the exact onset of the reionization was, what objects were responsible for it, and how quickly intergalactic space was ionized. Astronomers believe that low-

News & Views:

- short (<1000 words)
- why is a paper important?
- what is the context?
- what are potential limitations?
- what is the outlook?

What type of content does Nature Astronomy publish?

PUBLISHED: 2 MAY 2017 | CORRECTED 26 MAY | VOLUME: 1 | ARTICLE NUMBER: 0121

comment

Cosmology at a crossroads

Wendy L. Freedman

We are at an interesting juncture in cosmology. Despite vast improvements in the measurement accuracy of the Hubble constant, a recent tension has arisen that is either signalling new physics or as-yet unrecognized uncertainties.

Just under a century ago, Edwin Hubble revolutionized cosmology with his discovery that the Universe is expanding. Hubble found a relationship between radial velocity and the distance to nearby galaxies, determining the proportionality constant H_0 (= v/r), that now bears his name. The Hubble constant remains one of the most important parameters in cosmology. An accurate value of H_0 can provide a powerful constraint on the cosmological model describing the evolution of the Universe. In addition, it characterizes the expansion rate of the Universe at the current time and defines the observable size of the Universe; its inverse sets the expansion age of the Universe.

Hubble originally measured a value of $H_0 = 500$ km s^{-1} Mpc^{-1} (ref. [1]). Later revisions led to a range between 50 and 100. Resolution of this discrepancy ultimately required the ability to measure accurate distances: a new generation of digital detectors and the launch of the Hubble Space Telescope (HST). As part of the Hubble Key Project, the value of H_0 was measured to be 72 ± 2 (statistical)

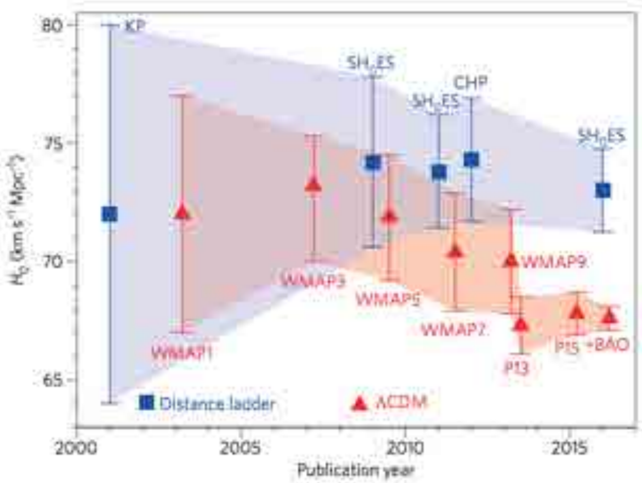


Figure 1 | The current tension in the determination of H_0. Recent values of H_0 as a function of publication date since the Hubble Key Project. Symbols in blue represent values of H_0 determined in the nearby Universe with a calibration based on the Cepheid distance scale. Symbols in red represent derived values of H_0 based on an adopted cosmological model and measurements of the CMB. Labels indicate the different experiments and data sets used for the determination of H_0 values. The blue- and red-shaded regions show the evolution of the uncertainties in these values, which have been decreasing for both methods. The most recent measurements disagree at greater than 3σ. Figure adapted from ref. [18], AAS/IOP.

Comment:

- short (<1500 words)
- a timely topic
- highly opinionated
- concise and to the point
- few references + figures

SPRINGER NATURE

What type of content does Nature Astronomy publish?

PERSPECTIVE
DOI: 10.1038/s41550-017-0221-2

nature astronomy

The future of astronomy in Australia

Elaine M. Sadler

Australian astronomy has a bright future, thanks largely to recent government investments in major new telescopes, instruments and research centres. There are some short-term challenges as Australia's focus continues to shift from the current (mainly) national facilities for radio and optical astronomy to new multinational and global facilities.

Astronomy in Australia has enjoyed two long-term advantages: sustained government investment in people, infrastructure and research, and a history of innovative technical developments that have influenced the wider field (including multi-object fibre-fed spectrographs for optical telescopes, and wide-field multibeam and phased-array feed receivers for radio telescopes). Until the mid-1990s, all of Australia's national telescopes — the 4-m Anglo-Australian Telescope (AAT) at Coonabarabran, the 64-m Parkes dish and the Australia Telescope Compact Array radio telescope at Narrabri — were located onshore. More recently, Australia has joined international partnerships to access current and future offshore telescopes. An increasing fraction of our astronomy research is also carried out in large, multinational teams.

The public profile of Australian astronomy is high, and was further boosted by the award of the 2011 Nobel Prize in Physics to Canberra-based astronomer Brian Schmidt. The past decade has seen a surge in new funding for telescopes and instrumentation, supercomputers, and researchers. Much of this funding is for projects linked to the international Square Kilometre Array (SKA) radio telescope, which Australia is co-hosting, but it also includes support for optical/infrared astronomy through Australian membership of the international Giant Magellan Telescope (GMT) and new instruments for the AAT.

optical/infrared telescopes (via membership in the European Southern Observatory (ESO) or another partnership).

Over the past decade, the total funding for optical and radio astronomy has met, and in some cases exceeded, the level envisaged in the 2006–2015 Decadal Plan. The plan set a goal of A$125 million of new capital funding over the decade, in addition to the long-term operational funding for the national facilities operated by Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Astronomical Observatory (AAO) (a total of A$20 million per year at the start of the decade, rising to A$26 million per year by 2015).

The first five years of this Decadal Plan period (2006–2011) saw major investment in astronomy infrastructure and facilities, with a total capital expenditure of A$230 million (A$130 million for new radio astronomy facilities and support, and A$100 million for optical astronomy)[1]. These new funds supported the construction and operation of two SKA pathfinder telescopes (the Australian SKA Pathfinder (ASKAP; Fig. 1), and the low-frequency Murchison Widefield Array (MWA; Fig. 2)), Australia's participation in the international SKA project, a 10% partner share in the GMT, upgrades to the 4-m AAT, and the purchase of observing time for Australians on overseas 8-m-class optical telescopes (typically around 30–35 nights a year).

Perspectives:

- **medium (<3000 words)**
- **a timely topic, a developing field**
- **opinionated but objective**
- **<50 references, figures**

What type of content does Nature Astronomy publish?

REVIEW ARTICLE
DOI: 10.1038/s41550-017-0223-0

nature astronomy

Archaeology of active galaxies across the electromagnetic spectrum

Raffaella Morganti[1,2]

Analytical and numerical galaxy-formation models indicate that active galactic nuclei (AGNs) likely play a prominent role in the formation and evolution of galaxies. However, quantifying this effect requires knowledge of how the nuclear activity proceeds throughout the life of a galaxy, whether it alternates with periods of quiescence and, if so, on what timescales these cycles occur. This topic has attracted growing interest, but making progress remains a challenging task. For optical and radio AGNs, a variety of techniques are used to perform a kind of 'archaeology' that traces the signatures of past nuclear activity. Here we summarize recent findings regarding the lifecycle of an AGN from optical and radio observations. The limited picture we have so far suggests that these cycles can range from long periods of 10^7–10^8 yr to shorter periods of 10^4–10^5 yr, even reaching extreme events on timescales of just a few years. Together with simulations, observational results regarding the multiple cycles of AGN activity help to create a complete picture of the AGN lifecycle.

The impact of the energy released by an active galactic nucleus (AGN) — that is, an active supermassive black hole (SMBH) — on its host galaxy has been recognized as a mechanism that could reconcile, over cosmic timescales, the observed number density of (massive) galaxies with that predicted by simulations, as well as the observed relationship between black holes and bulge masses[1–3]. The energy produced by the AGN can remove, or at least redistribute, gas in and around a galaxy by driving massive and fast outflows, and can prevent this gas from cooling. These processes, observed in many objects[4–8], can quench star formation and stop the growth of the SMBH.

A number of optical and radio studies[9–12] have suggested that the period over which an SMBH is active is limited to a fraction of the typical lifespan of the host galaxy; that is, the SMBH is regularly re-ignited after a period of inactivity (or low activity), which rejuvenates the AGN. How long these periods last is strongly dependent on the galaxy's environment[13]. Defining these cycles is further complicated by the different modes of nuclear activity[11,14,15] — radia- for optical and radio AGNs. This provides exciting perspectives for new and upcoming observing facilities.

This Review presents an overview of recent findings to illustrate the variety of cycles of activity identified in radio and optical AGNs: long timescales of 10^7–10^8 years have been traced at radio wavelengths, and short timescales of 10^4–10^5 years (and down to as short as years) at optical wavelengths. This variety is mostly the result of the different techniques used to trace and time the activity in optical and radio AGNs, leading to different groups of objects and different sampling timescales. Despite the biases, these studies are helping us understand how the nuclear activity proceeds. A brief summary of some of the results from the optical studies is presented. However, most of the focus is on radio AGNs, for which new low-frequency radio telescopes, in particular the LOw-Frequency ARray (LOFAR; Box 1)[16], are opening the possibility of major steps forward in exploring the lifecycle of these AGNs. This Review describes the first results that illustrate the importance of this addition, as well as providing future perspectives for the field.

Reviews:

- long (>4000 words)
- a mature field, a topic of general interest
- authoritative, objective
- ~100 references, figures

SPRINGER NATURE

What type of content does Nature Astronomy publish?

meeting report

ACTIVE GALAXIES

Reality and myths of AGN feedback

Feedback from active galactic nuclei (AGNs) remains controversial despite its wide acceptance as necessary to regulate massive galaxy growth. Consequently, we held a workshop in October 2017, at Leiden's Lorentz Center, to distinguish between the reality and myths of feedback.

Over the past few decades it has become the consensus that black holes, whose existence has recently been directly confirmed through the detection of gravitational waves, exist at the heart of every massive galaxy. The accretion of ... holes, which often ... masses, releases e... energy across the ... Twenty years ago, ... that, in principle, ... outflows of gas wi...

the velocity structure and sizes of ionized gas outflows for published datasets (chairs: Bernd Husemann and Marios Karouzos). We clearly established that spatially resolved data contain more information than is often recovered using standard techniques.

systematic multi-frequency observations of unbiased and large samples using Atacama Large Millimeter/submillimeter Array (ALMA), Spectrograph for INtegral Field Observations in the Near Infrared (SINFONI), Multi Unit Spectroscopic

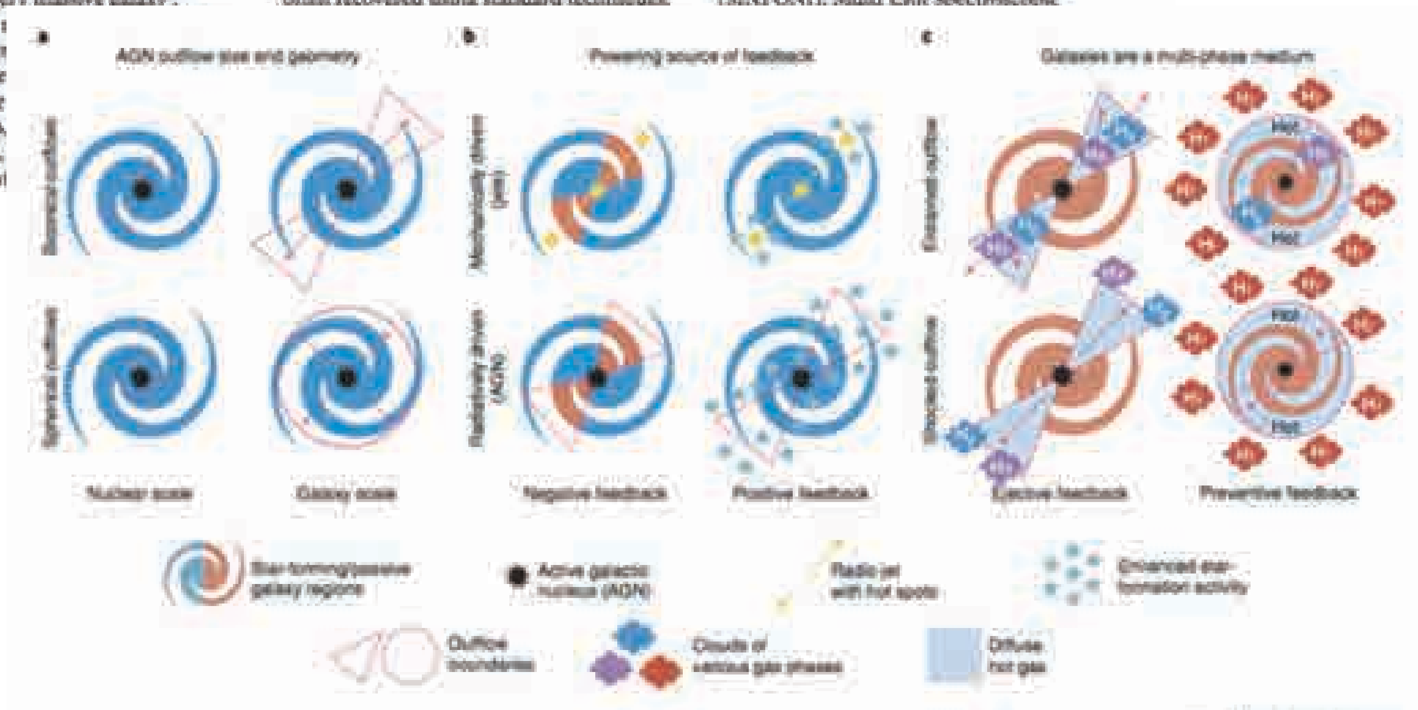


Fig. 1 | Schematic representation of the important discussion points during the workshop. a, We discussed if current observations can differentiate between

Meeting reports:

- short (<1000 words)
- meetings on timely topics
- summary or highlights

SPRINGER NATURE

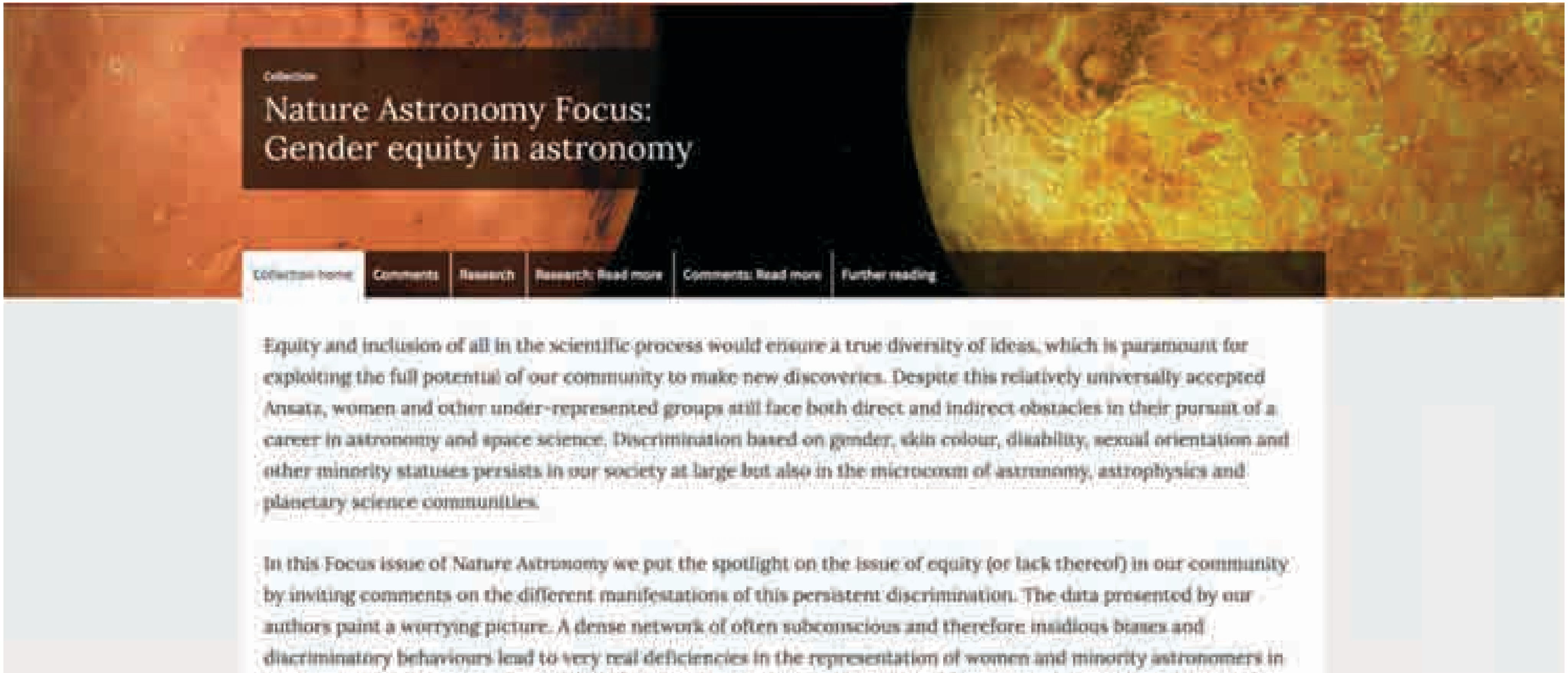
What type of content does Nature Astronomy publish?

Books & Arts:

Reviews of

- books
- exhibitions
- board games (!)
- performances

What type of content does Nature Astronomy publish?



Collection

Nature Astronomy Focus: Gender equity in astronomy

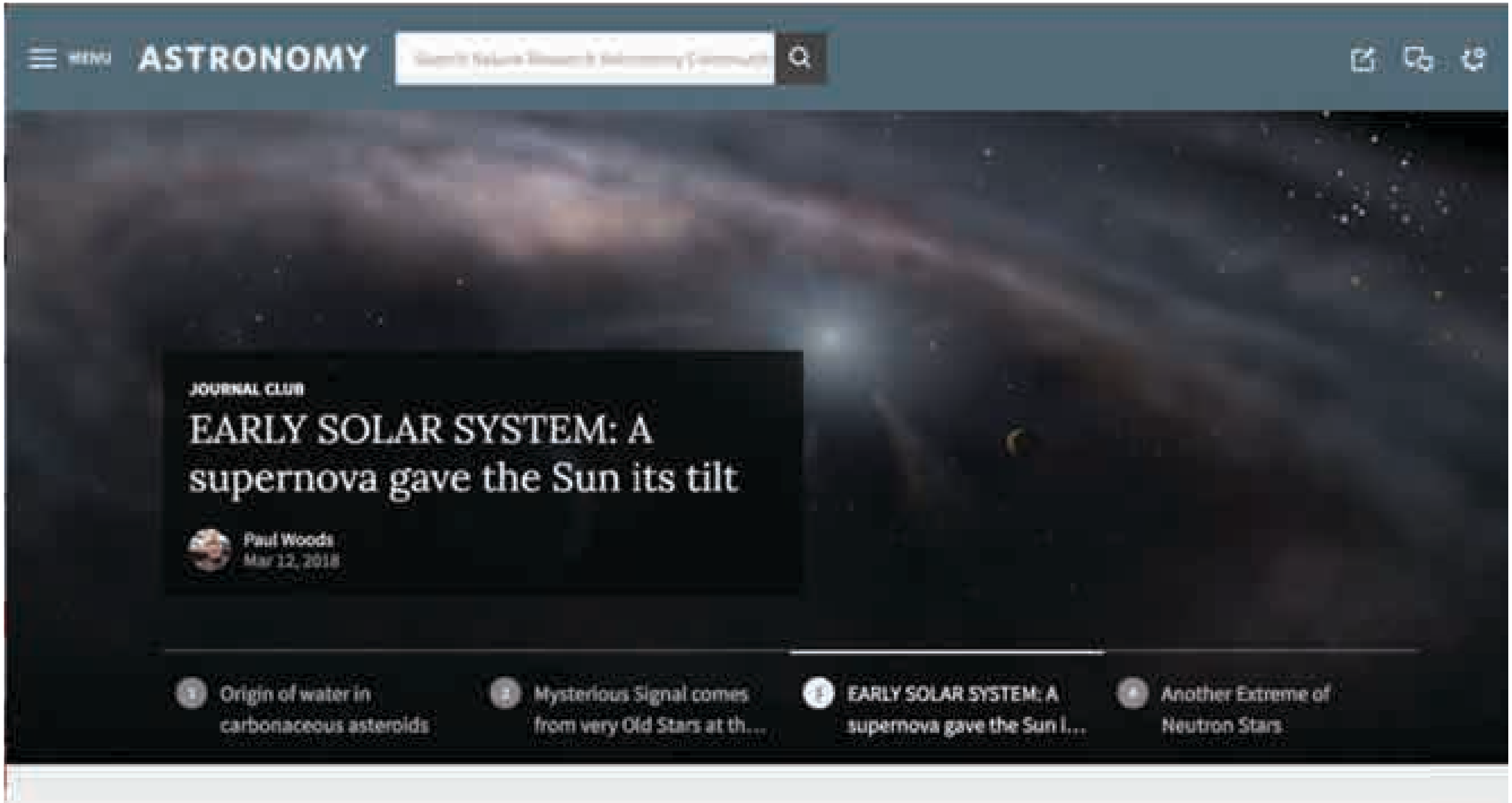
Collection home | Comments | Research | Research: Read more | Comments: Read more | Further reading

Equity and inclusion of all in the scientific process would ensure a true diversity of ideas, which is paramount for exploiting the full potential of our community to make new discoveries. Despite this relatively universally accepted Ansatz, women and other under-represented groups still face both direct and indirect obstacles in their pursuit of a career in astronomy and space science. Discrimination based on gender, skin colour, disability, sexual orientation and other minority statuses persists in our society at large but also in the microcosm of astronomy, astrophysics and planetary science communities.

In this Focus issue of Nature Astronomy we put the spotlight on the issue of equity (or lack thereof) in our community by inviting comments on the different manifestations of this persistent discrimination. The data presented by our authors paint a worrying picture. A dense network of often subconscious and therefore insidious biases and discriminatory behaviours lead to very real deficiencies in the representation of women and minority astronomers in

A new online astronomy community!

https://astronomycommunity.nature.com/



Different channels of content:

- Behind the paper
- Gallery
- Journal club
- On the road
- In the community
- From the editors

Presenting the team

All us editors have a PhD in physics/astronomy and several years of postdoctoral research experience

May Chiao

Chief Editor

(Astro)physics
Radio astronomy
Low-temperature physics
Superconductors
Superfluids

Presenting the team

All us editors have a PhD in physics & astronomy and several years of postdoctoral research experience

May Chiao

Chief Editor

Luca Maltagliati

Background: solar physics, planetary atmospheres

Planets
Exoplanets
Sun

Presenting the team

All us editors have a PhD in physics & astronomy and several years of postdoctoral research experience

May Chiao

Chief Editor

Luca Maltagliati

Paul Woods

Background: astrochemistry

Stars
ISM
Milky way¥local group

Presenting the team

All us editors have a PhD in physics & astronomy and several years of postdoctoral research experience

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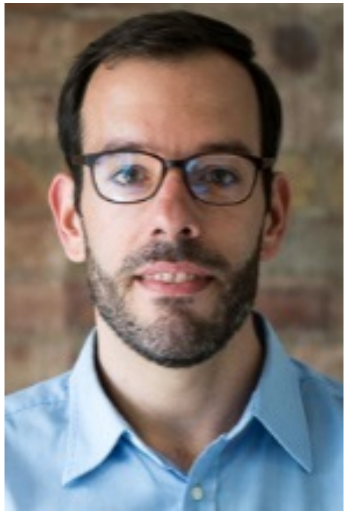
Paul Woods

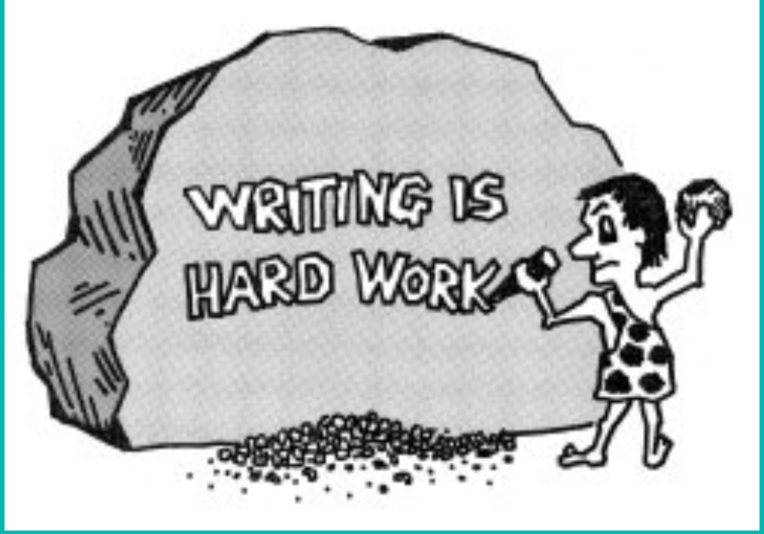


Marios Karouzos

Background: galaxy evolution, black holes

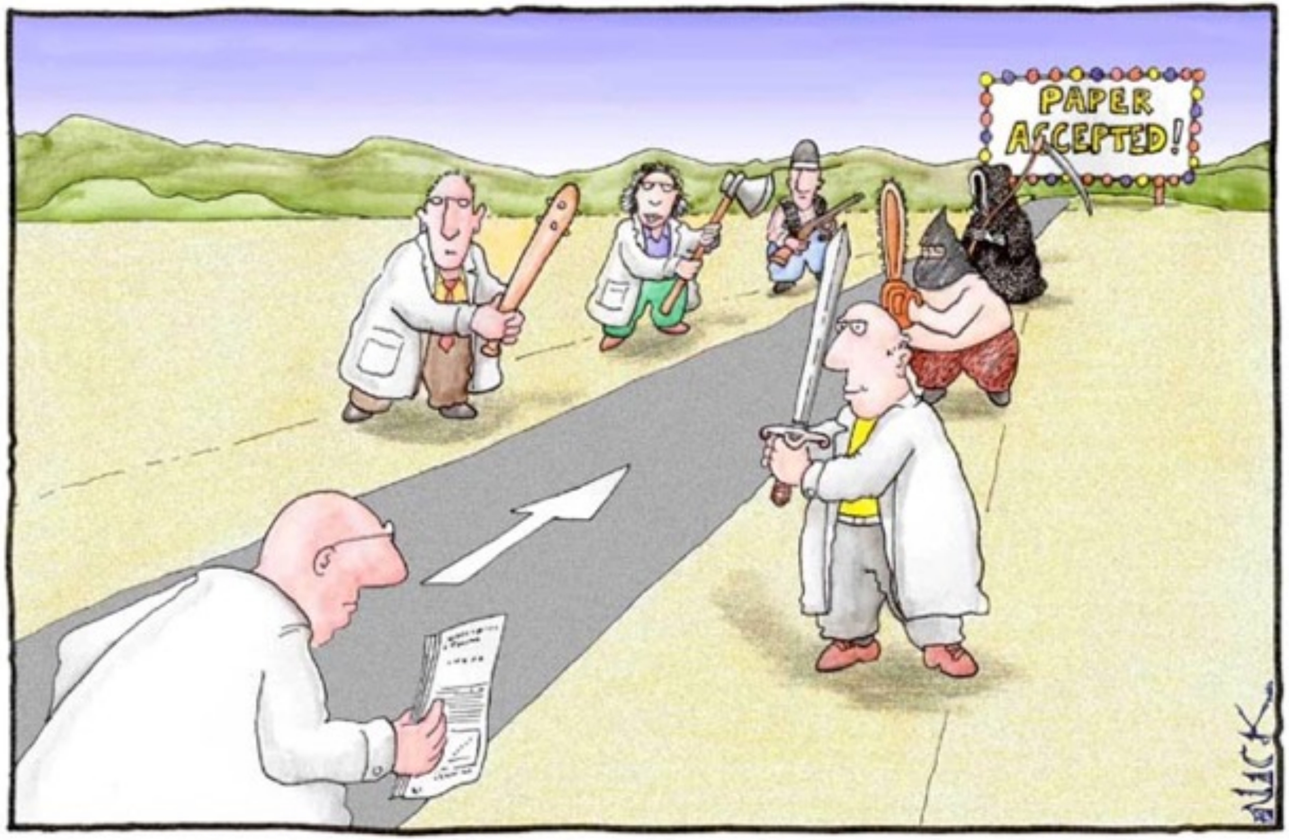
extragalactic astronomy
cosmic star formation
Black holes
Early Universe¥cosmology

How do I get published in Nature Astronomy?



The editorial process

Paper submitted → Standard peer-review cycle



The editorial process

Paper submitted → An Editor is assigned

Standard peer-review cycle

If YES

Editors are full-time professionals (→ no direct conflict of interest)

No editorial board (but internal discussion is possible)

Editors handle specific areas of expertise (but we are flexible)

Assessment whether the paper meets our editorial criteria

Editors work also during peer-review…

Standard
peer-review
cycle

Standard editoral job (assigning referees, make decision)

Added value: work on the manuscript – identification of unclear points, suggestions for rephrasing¥sharpening the message…

Style check and further detailed suggestions once the manuscript is accepted in principle; iteration with the authors

"Hurdles" between you and publication

The editor(s)

The editor is looking for:

- **A significant advance** (context is important here!)
- **A logical development of the paper** (not a timeline!)
- **A well-written paper** (the audience are not all experts in one field)
- **No 'hype'** (immediate implications, not far-flung predictions)

The referees

The referees are looking for:

- **A significant advance**
- **Technical/Conceptual flaws that prevent publication**
- **Original conclusions**
- **Immediate interest to people in their research area**

Editors work also during peer-review…

Timing: less than one week (often 3-4 days) for first assessment; then highly dependent on quickness to find all referees and for them to get the reports – 30-35 days is a good reference

And what if you don't agree with the decision?

Appeal!
We always reconsider papers when the authors disagree with our decision.

→explain why you believe we have overlooked or misunderstood something

→list of friends or 'celebrities' who liked your paper generally does not help

→ need a strong case to replace a referee; revised manuscripts normally go back to same referees

Services to authors!

(from pre-submission to acceptance and beyond)

- Pre-submission possibility
  → send us a couple of plots and an abstract
  → send us your draft in favourite format (ApJ, MNRAS, A&A)

- Post-acceptance support
  → iterate with editor to improve text, figures, layout
  → News & Views piece to highlight paper (usually with custom art)

- Press and publicity
  → press releases for a number of papers
  → multimedia team can create content to support paper (video)
  → art department can collaborate with author for cover
  → cross-Nature publicity (Nature, Nature Physics, etc.)

SharedIt

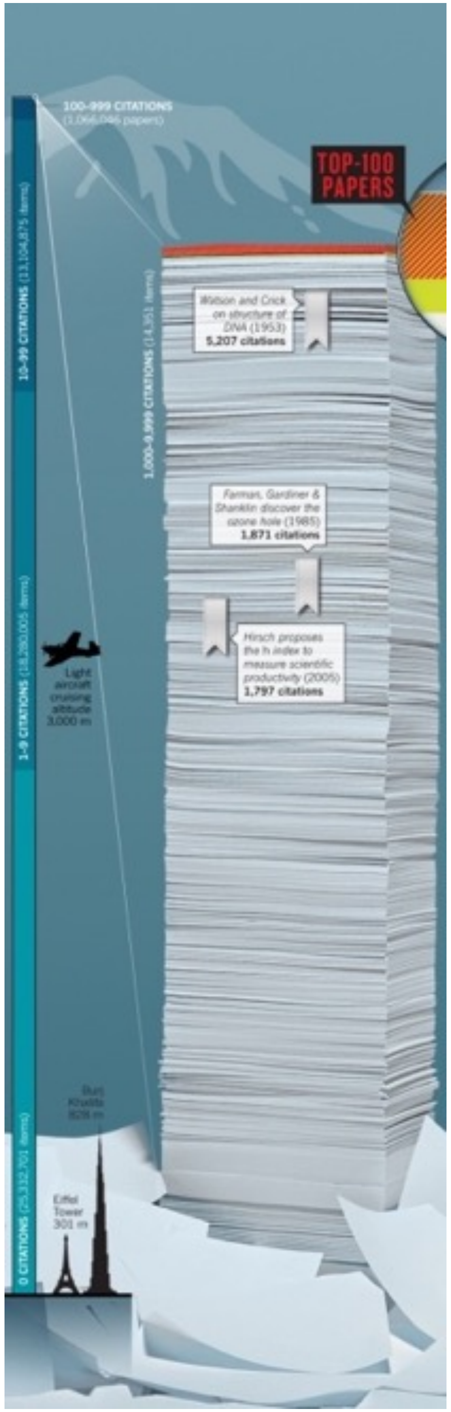
nature *wants researchers to share content easily and legally.*

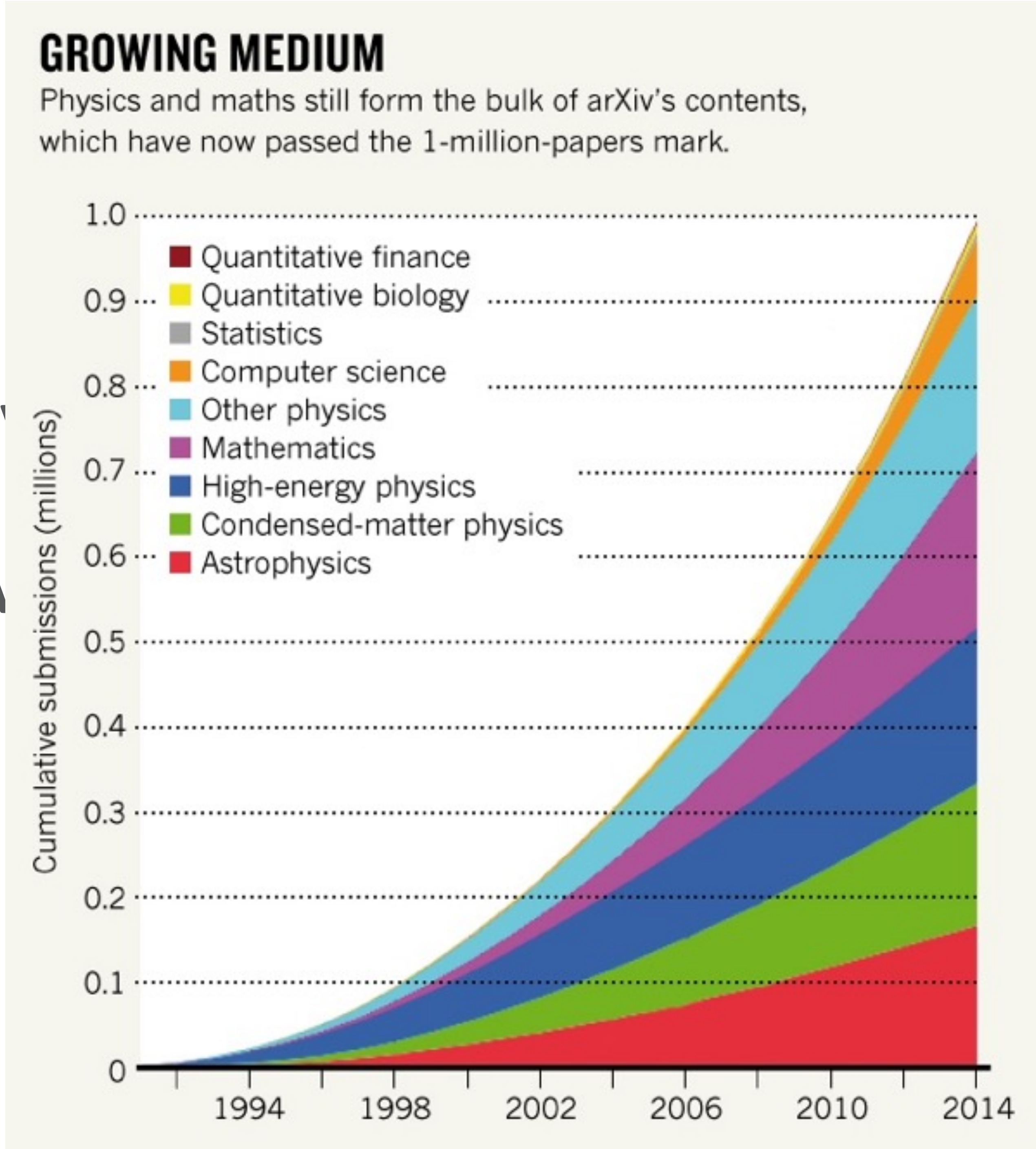
*Our **SharedIt** content-sharing means that links to view-only, full-text subscription research articles can be posted anywhere - including on social media platforms, author websites and in institutional repositories* [*http://www.springernature.com/gp/researchers/sharedit*](http://www.springernature.com/gp/researchers/sharedit)

The jungle of academic publishing: survival of the fittest!

Ov ers

A ls





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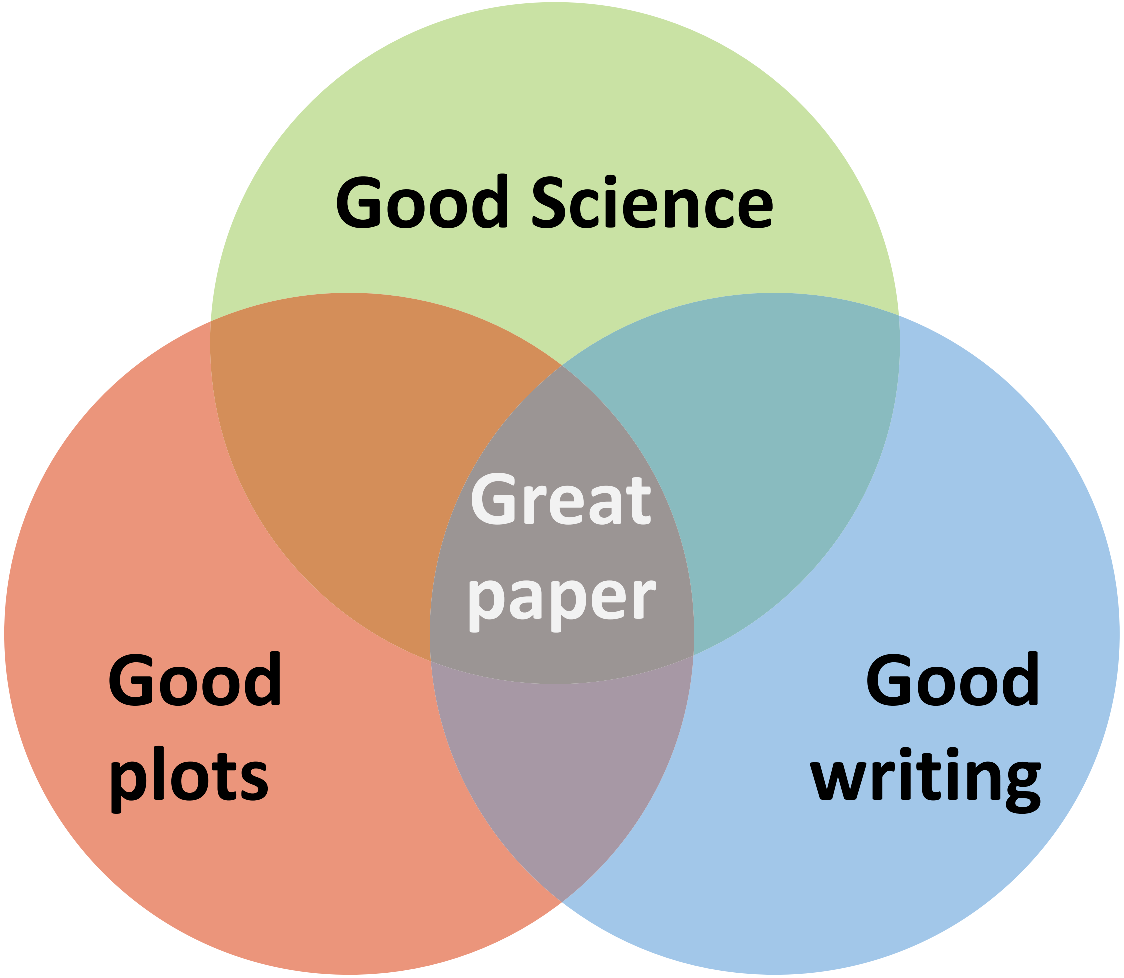
your paper
Cornell University
Library
arXiv.org

Writing the elusive "Great paper"…



Turning your great science into a GREAT paper

A GREAT paper should:

- be the culmination/celebration of a project, big or small
- be written with the same attention to detail – and passion – as the research underlying it
- be read, used and even enjoyed

A GREAT paper shouldn't:

- be written and published solely for bolstering a CV.
  (just because it is written doesn't necessarily mean that it should be)
- be seen as a chore to write – if you do not feel any passion for the paper, it is most unlikely that others will!

Know your audience

Have I assumed to much prior knowledge?

- Explaining is not the same as ‘dumbing down’
- Even specialists struggle to follow highly technical arguments – help them!
- Be succinct, but don’t be obtuse – and don’t write in ‘code’!

Be realistic

- Not every result will ‘disprove Einstein’
  (yet many results may motivate/inspire outside immediate community)
- Don’t hype – you want to attract expert readers, not put them off
- Feel free to speculate – but clearly label it as such

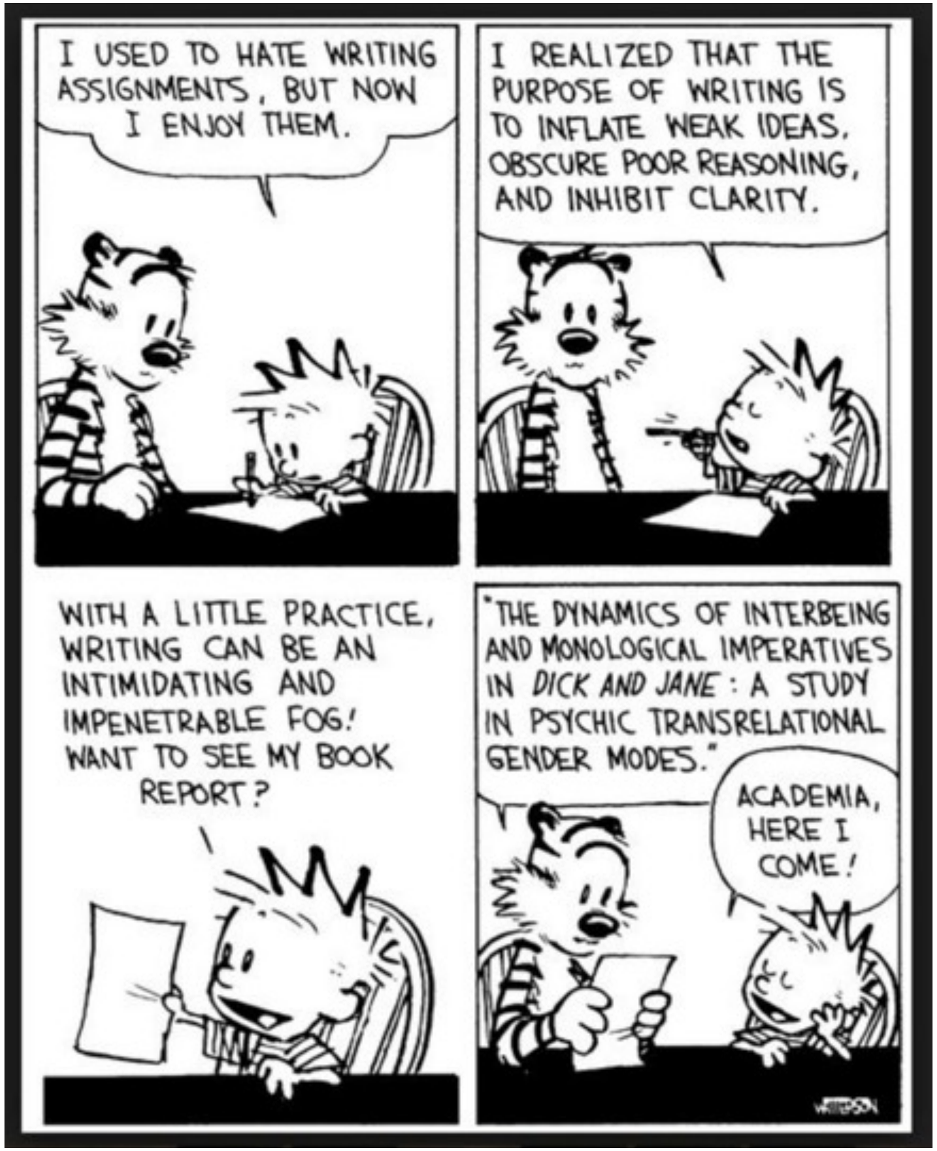
Credit: Calvin and Hobbes

Everyone is busy

Authors, referees, editors and readers are all busy people – time is precious

Impactful paper = read paper (!)
→ time investment required from reader

Getting key information across as efficiently and as usefully as possible

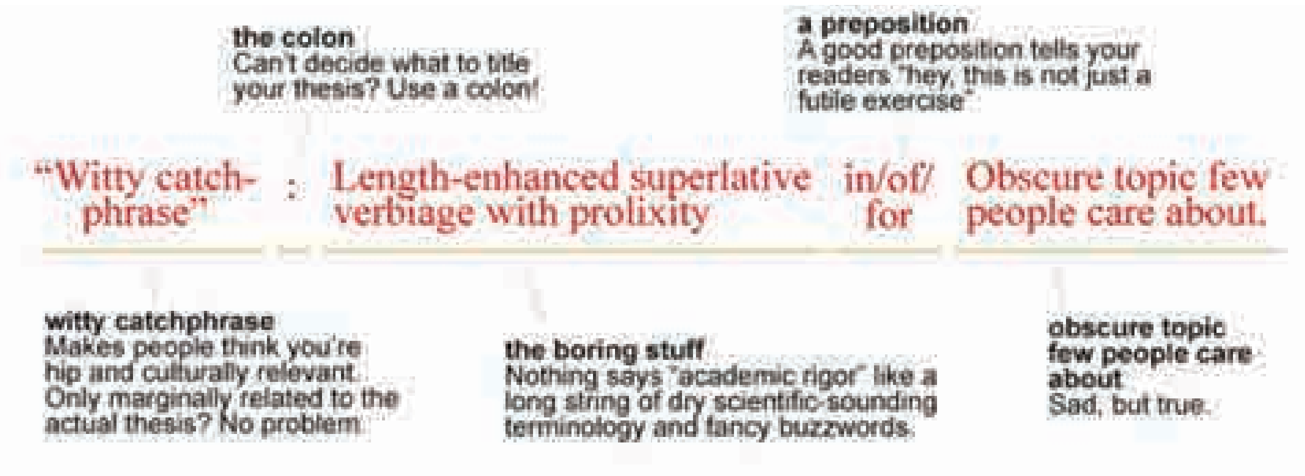


Be mindful of your readers' time #1

A lesson from journalism

- You are competing for readers' time → capture their attention from the outset. Best news items always start with the news.

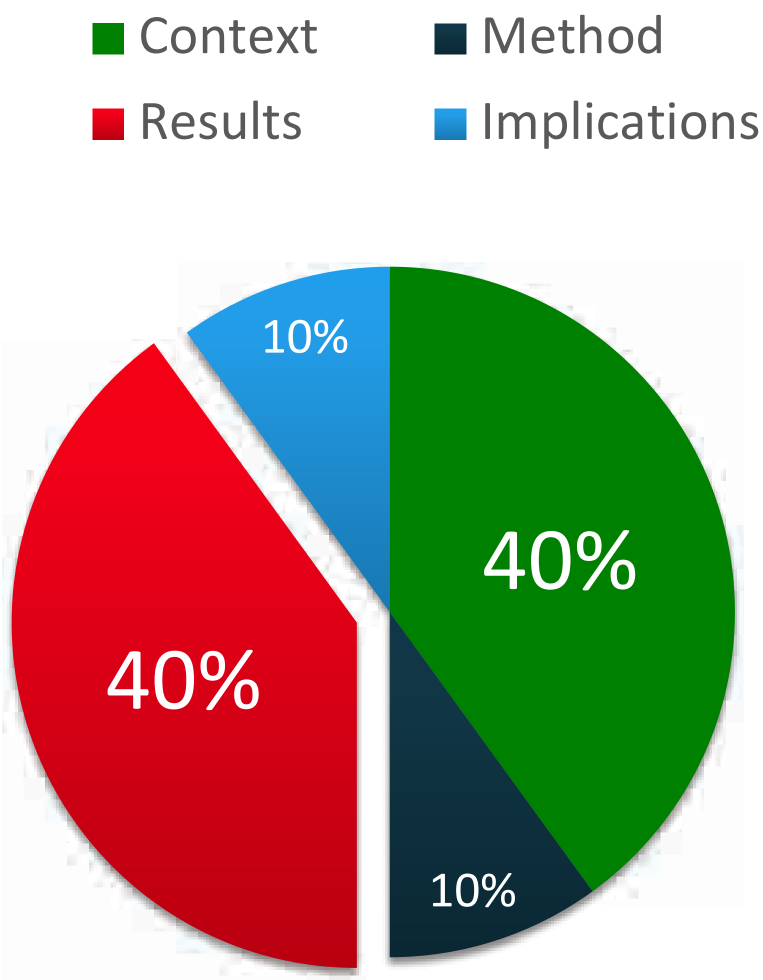
Titles:
- Avoid open-ended titles and state the main finding of the work
- Don't use acronyms, abbreviations, or other field-specific jargon
- Don't be witty or catchy at the expense of clarity



Credit: PhDComics

Abstract: your paper's best chance to success!

You are competing for readers' time → Provide context. Lead with the news. Spell out the significance.



1. Set the context before launching into the details
2. Avoid acronyms and abbreviations as much as possible
3. Do not throw jargon at the reader from the get go
4. Make your results accessible to people that have not read your methods and analysis section
5. If space allows, provide a one-sentence outlook ("watch this space")

Be mindful of your readers' time #2

Organise your thoughts

- Bullet-point your message and arguments, and build the paper around that
- Strip down to the elements essential to conveying the results
  (build a narrative conductive to explaining your results)
- Do not pad the main paper out with superfluous information…
- …but don't leave out anything important or gloss over problematic issues

Signposting as you go

- Guide the reader:

  → start each section with brief statement of what follows

  → title your figures and tables!

  → able to quickly navigate through the paper to follow the gist

Structure of a Nature paper

Standard paper	Nature Astronomy paper
Abstract	First paragraph (in bold)
Introduction	Few words on data¥model
Methodology	Main result(s)
Results	Discussion
Discussion	Perspectives
Conclusions	
	Methods

Finished? Not so fast…

BEFORE submitting your paper to a journal:

1. Leave your paper alone for 1-2 weeks, do something else, then go back and read it again.
2. Print out your paper, find a quiet corner, read your paper again!
3. Send your abstract to a couple of specialist and non-specialist colleagues, ask them what they think the main result of your paper is.
4. Ask a trusted colleague (NOT your supervisor), preferably at another institute (NOT your co-author or collaborator), to read your paper and provide honest feedback.

Credit: PhDComics

Get in touch!

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