

SUBJECT

A

- Abell 21. *See* Medusa Nebula
- Abell 85 (CTB 1) (supernova remnant), image of, 12:56–57
- Abell 194 (galaxy cluster)
 - image of, 1:50
 - overview of, 1:50
- Abell 1656. *See* Coma Cluster of Galaxies
- Abell 2151. *See* Hercules Galaxy Cluster
- Abell 2744 (Pandora’s Cluster), image of, 7:27
- active galactic nuclei. *See* black holes; quasars; Seyfert galaxies
- Active Region 3664, 8:54–55
- Aditya-L1 solar observatory, launch of, 2:19
- Advanced space-based Solar Observatory (ASO-S), 2:25
- AGNs. *See* black holes; quasars; Seyfert galaxies
- AI. *See* artificial intelligence
- Alcor (80 Ursae Majoris) (star), image of, 10:18
- ALMA (Atacama Large Millimeter/submillimeter Array), PHANGS collaboration, 6:36
- Alpha Persei Cluster (Collinder 39; Melotte 20; Perseus Moving Group) (open cluster)
 - cataloging of, 1:8
 - discoveries regarding, 1:8
 - image of, 1:8
 - overview of, 1:8
- Alpha Persei (Mirfak) (star), 1:8
- Alpha Ursae Minoris (Polaris) (star), binocular observations of, 2:53
- Ancient Thebit (feature on Moon), 7:36, 38
- Anders, William “Bill,” death of, 9:7
- Andromeda Galaxy (M31)
 - advances in understanding of, 9:24–27
 - distance from Earth, 8:40
 - future collision with Milky Way, 3:25, 8:16
 - hydrogen gas in arms of, 12:9
 - image of, 5:41
 - image of over mountains, 10:57
 - image of with comet, 6:55
 - image of with Perseid trail, 3:57
 - lesser known satellite galaxies, 1:11
 - observing, 8:38–39
 - Slipher’s observations of blueshift, 12:18–20
- Angel Nebula (NGC 2170), image of, 5:54
- Ant Nebula (Menzel 3)
 - image of, 1:38–39
 - overview of, 1:38
- Antennae Galaxies (Ringtail Galaxies; Arp 244; NGC 4038/39)
 - images of, 1:37, 12:55
 - observing, 1:37
 - overview of, 1:37
- Anthropocene epoch, 6:9
- Apollo 8 mission, death of Frank Borman, 3:7
- Apollo 10 mission, discarded lunar module *Snoopy*, 12:52
- Apollo 16 mission, death of Ken Mattingly, 3:7
- Apollo missions, discarded lunar modules, 12:52
- Apophis (near-Earth asteroid), mission to, 2:15
- Ariadne’s Hair. *See* Coma Star Cluster
- Ariane 6 rocket, first demonstration flight, 11:9
- Arp 84 (Heron Galaxy; NGC 5394/95), image of, 9:55

Astronomy Magazine Article Subject Index 2024

- Arp 103. *See* Zwicky's Triplet
- Arp 104. *See* Keenan's System
- Arp 135. *See* NGC 1023
- Arp 142 (interacting galaxies), 11:7
- Arp 148. *See* Mayall's Object
- Arp 242. *See* Mice Galaxies
- Arp 244. *See* Antennae Galaxies
- Arp 248. *See* Wild's Triplet
- Arp 273 (The Rose) (galaxy pair), image of, 3:56
- Arp 325 (galaxy cluster), 1:43
- Arp 332 (galaxy cluster), 1:43
- Arp-Madore 2105-332 (interacting galaxies), image of, 10:58
- Artemis I mission, overview of, 2:18
- Artemis II mission
 - crew announced, 2:18
 - scheduled launch date, 2:18
- Artemis III mission, landing site, 2:18
- Artemis program
 - cancellation of VIPER mission, 12:8–9
 - experiments aboard Odysseus mission, 6:8–9
 - goal of Japanese national as first non-American on Moon, 8:7
 - Japanese development of lunar rover, 8:7
 - Southwest Research Institute's role, 5:39
- artificial intelligence (AI)
 - identifying samples produced by life or abiotic processes, 2:17
 - searching images for exoplanets, 2:17
 - searching radio data for signs of life, 2:17
- ASASSN-20qc (binary black hole system), 8:6–7
- ASO-S (Advanced space-based Solar Observatory), 2:25
- asterisms. *See names of specific asterisms*
- asteroid belt
 - collision avoidance for spacecraft passing through, 12:52–53
 - density of Jupiter's Trojans versus, 5:51
- asteroids
 - See also names of specific asteroids*
 - Chicxulub impact, 2:9, 12:10
 - contact binary orbiting another asteroid, 2:8
 - DART mission, 3:18–19
 - density of Jupiter's Trojans versus main belt, 5:51
 - possible collisions with Earth, 3:18–20
 - surveilling and deflecting, 3:18–20
 - using to anchor solar reflector to mitigate climate change, 3:19
 - water on, 6:7
- Astrobiotic, Peregrine Mission 1, 6:9
- astroimaging
 - autoguiding, 9:42–46
 - capturing Hubble-like shots, 6:48
 - coma correctors, 10:46–49
 - dealing with light pollution, 7:48
 - DSLR challenges, 5:42
 - long-exposure images over multiple nights, 11:51
 - nightscapes, 7:45
 - processing images from JWST, 9:38–41
 - recommendations for starter equipment, 10:50
 - solar eclipses, 4:50–54
 - teamwork and collaboration in, 5:40–45
 - wideband versus narrowband imaging, 6:48
 - wide-field imaging, 6:38–43, 7:40–45

Astronomy Magazine Article Subject Index 2024

astronauts

See also names of specific astronauts

Anders, Bill, 9:7

Dwight, Ed, 9:9

Engle, Joe, 11:9

Kononenko, Oleg, 9:7

longest amount of time spent in space, 9:7

longest spaceflight by US astronaut, 2:7

oldest to enter space, 9:9

potential of lunar caves as habitat for, 11:8–9

Rubio, Frank, 2:7

sheltering in ISS return vehicles due to danger from space debris, 11:7

Stafford, Tom, 7:7

using cylinder-shaped exercise space, 9:7

astronomical almanacs, 7:24–25

astronomy

dark-sky observing in Turkey, 2:36–41

daytime study of the universe, 2:54

fun of, 2:10

observing deep-sky objects, 10:14–23

observing objects spanning at least one degree, 2:42–45

101 weirdest cosmic objects, 1:7–27, 36–58

top 10 stories of 2023, 2:12–21

Astronomy magazine

Guide to the Night Sky 2025, 12:supp

purchase of by Firecrown Media, 10:5

Star Products, 10:36–43

AT2022tsd (Tasmanian Devil) (LFBOT object), 3:10

Atacama Large Millimeter/submillimeter Array (ALMA), PHANGS collaboration, 6:36

atmosphere

of Earth, changes in current in upper ionosphere caused by GRB, 3:9

of Earth, Novaya Zemlya effect, 3:14

of exoplanets, puffy atmosphere, 10:7

of exoplanets, rocky super-Earth with thick atmosphere, 9:13

of Mars, oxygen extracted from, 3:10

of Mars, potential to warm plant by releasing metallic nanorods into, 12:9

Atoms for Peace Galaxy (NGC 7252)

image of, 1:54–55

overview of, 1:55

aurorae

caused by G5-level storm, images of, 8:55–57, 9:11

image of over Norwegian fjord, 6:54

image of over Yosemite, 11:54

image of with Geminid trails, 5:54

STEVE phenomena, 2:57

wide-field imaging of, 6:43

autoguiding, 9:42–46

B

B2 0402+379 (elliptical galaxy), binary black holes at center of, 7:9

Barnard 33. *See* Horsehead Nebula

Barnard 44 (dark nebula), 1:41

Barnard 45 (dark nebula), 1:41

Barnard 59/65/66/67/72/77/78. *See* Pipe Nebula

Barnard 72. *See* Snake Nebula

Barnard 142 (dark nebula), 1:23

Barnard 143 (dark nebula), 1:23

Barnard 353 (dark nebula), 10:12

Astronomy Magazine Article Subject Index 2024

- Barnard's E (dark nebulae)
 - image of, 1:23
 - observing, 1:23
 - overview of, 1:23
- Barnard's Galaxy (NGC 6822)
 - discoveries regarding, 1:39
 - image of, 1:39
 - observing, 1:39
 - overview of, 1:39
- Barnard's Loop (Sh 2–276) (emission nebula)
 - images of, 1:36, 2:43
 - observing, 1:36, 2:43
 - overview of, 1:36
 - wide-field imaging of, 7:42
- Barnard's Star (red dwarf)
 - discovery of, 1:26
 - image of, 1:26
 - overview of, 1:26
- barred spiral galaxies. *See names of specific barred spiral galaxies*
- BEAM (Bigelow Expandable Activity Module), 11:9
- Beehive Cluster (M44), conjunctions of Venus and Mars with, 12:12
- BeiDou navigational satellite constellation, 2:22
- Bennu (asteroid), analysis of sample collected from, 2:14–15
- BepiColombo mission, scheduled flyby date, 2:21
- Beta Pictoris (star), “cat’s tail” in debris disk, 5:7
- Beta Ursae Minoris (Kochab) (star), 2:53
- Big Crunch, 3:25
- Bigelow Expandable Activity Module (BEAM), 11:9
- binary systems. *See names of specific binary systems*
- binocular astronomy
 - Celestron SkyMaster Pro Porro binoculars, 7:46–47
 - observation of lunar terminator, 11:52–53
 - observations within Ursa Minor, 2:53
 - sun projectors, 4:27
- black holes
 - See also names of specific black holes*
 - accretion disk formation, 5:18
 - anatomy of, 5:19
 - behavior of in dwarf galaxies, 11:10
 - binary, most massive, 7:9
 - binary, system of supermassive and intermediate-mass, 8:6–7
 - binary, wobble in system with star, 5:21–22
 - binary, X-ray, 5:19
 - comparative mass of, 5:25
 - development of understanding of, 8:19
 - Eddington rate, 5:9
 - effect on massless photons, 9:52–53
 - erroneous vacuum cleaner analogy, 5:24
 - first image of, 5:18
 - Hawking’s area theorem, 6:51
 - heaviest dormant, 9:9
 - heavy seeding theory, 5:9
 - intermediate-mass, binary system with supermassive, 8:6–7
 - intermediate-mass, comparative mass of, 5:25
 - intermediate-mass, evidence for in Omega Centauri, 12:10
 - massive, behavior of at center of dwarf galaxies, 11:10
 - mergers of, 6:50–51, 10:44–45
 - non-accreting, 5:20–25

Astronomy Magazine Article Subject Index 2024

- rogue, 5:24–25
 - stellar-mass, comparative mass of, 5:25
 - supermassive, at center of M87, spin of, 2:7
 - supermassive, binary system with intermediate-mass, 8:6–7
 - supermassive, comparative mass of, 5:25
 - supermassive, final parsec problem and mergers of, 9:51–52
 - supermassive, gravitational waves produced by collisions of, 2:18
 - supermassive, how they form at galactic centers, 3:50–51
 - supermassive, in early universe, 5:8–9
 - supermassive, longest observed TDE, 11:10
 - supermassive, measuring spin of, 9:8–9
 - supermassive, most distant seen in X-rays, 2:9
 - supermassive, oldest and most distant known, 7:50–51
 - supermassive, oldest known, 5:9
 - supermassive, pair at center of galaxy, 3:12
 - tidal disruption events, 11:10
 - Blinking Planetary Nebula (NGC 6826)
 - FLIERS, 1:17
 - image of, 1:17
 - overview of, 1:17
 - Blue Horsehead Nebula (IC 4592), image of, 5:56–57
 - Blue Snowball (NGC 7662) (planetary nebula), image of, 10:53
 - Bode’s Galaxy (M81)
 - distance from Earth, 8:40
 - image of, 5:43
 - observing, 8:39
 - Bond’s Galaxy (NGC 7793), 10:24–26
 - Boomerang Nebula
 - image of, 1:52
 - observing, 1:52
 - overview of, 1:52
 - Borman, Frank, 3:7
 - Breakthrough Starshot project, 6:19
 - brown dwarfs, smallest known, 5:7. *See also names of specific brown dwarfs*
 - Bubble Nebula (NGC 7635), image of, 11:56–57
 - Bug Nebula (NGC 6302), 1:40
 - Bullet Cluster (galaxy groups)
 - image of, 1:49
 - observing, 1:49
 - overview of, 1:49
 - Burbidge’s Chain (galaxy group)
 - image of, 1:43
 - observing, 1:43
 - overview of, 1:43
- ## C
- Caldwell 49. *See* Rosette Nebula
 - Caldwell 65 (Sculptor Galaxy; Silver Coin Galaxy; Silver Dollar Galaxy; NGC 253), 10:25–26
 - Caldwell 70. *See* Southern Pinwheel Galaxy
 - California Nebula (NGC 1499), wide-field imaging of, 6:40
 - carbon dioxide, on Europa, 2:9
 - carbon-nitrogen-oxygen (CNO) cycle, 11:16
 - Carina Nebula (NGC 3372), image of, 2:42
 - Cartwheel Galaxy (ESO 350–40)
 - discovery of, 1:45
 - image of, 1:45
 - observing, 1:45
 - overview of, 1:45

Astronomy Magazine Article Subject Index 2024

- CAS (Chinese Academy of Sciences), 2:25
- Cassini spacecraft
 - Southwest Research Institute's role, 5:37
 - tidal activity on Titan, 11:11
- Cassiopeia A (supernova remnant), 3:24
- Cave Nebula (Sharpless 2-155), image of, 9:56–57
- Celestron
 - Origin Home Observatory, 12:24–27
 - SkyMaster Pro Porro binoculars, 7:46–47
 - StarSense Autoguider (SSAG), 6:44–45
- centaurs
 - See also names of specific centaurs*
 - cometary activity, 7:10
 - orbital jumps, 7:10
- Centaurus A (NGC 5128) (elliptical galaxy), images of, 6:55, 11:55
- Center for Laboratory Astrophysics and Space Science Experiments (CLASSE), 5:38
- Cepheid variable stars
 - cosmic expansion, 6:9
 - determining distance via, 7:52–53
- CG4 (cometary globule), image of, 9:58
- Chamaeleon (constellation), image of star-forming region in, 7:58
- Chandra X-ray Observatory, most distant black hole seen in X-rays, 2:9
- Chandrayaan-3 mission, overview of, 2:18–19
- Chang'e-3 mission, 2:22
- Chang'e-4 mission, 2:24
- Chang'e-5 mission, 2:24, 26–27
- Chang'e-6 mission
 - lunar relay satellite, 2:26
 - overview of, 10:10–11
 - sample return, 10:10–11
- Chang'e-7 mission, proposal for, 10:11
- Checkmark Nebula. *See* Swan Nebula
- chemistry, spectral lines and associated compounds, 8:51
- CHES (Closeby Habitable Exoplanet Survey) mission, 2:25
- Cheyava Falls (feature on Mars), 11:11
- Chi Tauri (double star), observing, 12:45–46
- Chicxulub asteroid impact and crater
 - effects of light-blocking dust from, 2:9
 - possible origin of asteroid, 12:10
- China National Space Administration (CNSA)
 - overview of recent and future missions, 2:22–27
 - Strategic Priority Program (SPP), 2:25
- Chinese Academy of Sciences (CAS), 2:25
- Christmas Tree Galaxy Cluster (MACS0416), 3:12
- Cigar Galaxy (M82; NGC 3034)
 - distance from Earth, 8:40
 - image of, 5:43
 - observing, 8:39
 - star formation in, 7:10
- circumstellar disks, first extragalactic disk detected, 3:7
- CLASSE (Center for Laboratory Astrophysics and Space Science Experiments), 5:38
- Cleave, Mary, 3:7
- climate change and global warming
 - meteorites sinking in Antarctic ice, 8:7
 - using asteroid to anchor solar reflector, 3:19
 - warmest year on record, 5:9
- Closeby Habitable Exoplanet Survey (CHES) mission, 2:25
- Cloverleaf, The (odd radio circle), 10:8–9

Astronomy Magazine Article Subject Index 2024

- Cloverleaf, The (quasar)
 - image of, 1:50
 - observing, 1:50
 - overview of, 1:50
- CMB (cosmic microwave background), death of Arno Penzias, 5:9
- CMB-Stage 4 radio telescope array, 3:9
- CMEs. *See* coronal mass ejections
- CNO (carbon-nitrogen-oxygen) cycle, 11:16
- CNSA. *See* China National Space Administration
- Coalsack Nebula (dark nebula)
 - image of, 1:53
 - observing, 1:53
 - overview of, 1:53
- Cobra Head, The (feature on Moon), overview of, 7:36, 39
- Cocoon Galaxy (NGC 4490)
 - discovery of, 1:12
 - image of, 1:12
 - overview of, 1:12
- Cocoon Nebula (IC 5146), image of, 3:56–57
- Collinder 39. *See* Alpha Persei Cluster
- Collinder 256. *See* Coma Star Cluster
- Coma Cluster of Galaxies (Abell 1656)
 - images of, 1:52, 12:58
 - observing, 1:52
 - overview of, 1:52
- Coma Star Cluster (Ariadne’s Hair; Thisbe’s Veil; Collinder 256; Melotte 111)
 - image of, 1:25
 - names of, 1:25
 - observing, 1:25, 2:44
 - overview of, 1:25
- Comet 1P/Halley, discovery of, 6:25
- Comet 12P/Pons-Brooks (Devil Comet)
 - images of, 2:16, 3:54, 5:56–57, 6:55, 9:56–57
 - outbursts from, 2:16
 - viewing during eclipse, 4:19
- Comet 13P/Olbers, image of, 10:56
- Comet 2I/Borisov, 6:19
- Comet 67P/Churyumov–Gerasimenko, 6:20
- Comet C/2020 F3 (NEOWISE), wide-field imaging of, 7:42
- Comet C/2022 E3 (ZTF), 2:16
- Comet C/2023 P1 (Nishimura), 2:16
- Comet Interceptor mission, 6:18, 20–21
- comets, notable visits during 2023, 2:16. *See also names of specific comets*
- constellations, differences in recorded configuration of, 8:51. *See also names of specific constellations*
- contact binaries. *See names of specific contact binaries*
- Copeland’s Septet (Hickson 57) (galaxy group)
 - discovery of, 1:24
 - image of, 1:24
 - observing, 1:24
 - overview of, 1:24
- coronal mass ejections (CMEs)
 - images of aurorae caused by G5-level storm, 8:55–57, 9:11
 - overview of, 11:21–22
 - superflares, 3:20–22
- cosmic expansion
 - confirmation of HST’s findings on, 6:9
 - question of what the universe is expanding into, 11:51–52
 - radius versus age of universe, 6:52

Astronomy Magazine Article Subject Index 2024

Slipher's role in discovering, 12:14–23
Cosmic Gems arc (galaxy), 10:9
cosmic microwave background (CMB), death of Arno Penzias, 5:9
cosmological redshift/blueshift, 12:17–19
cosmology
 death of Arno Penzias, 5:9
 FLAMINGO project simulation, 2:8–9
 JWST's confirmation of HST's findings on Hubble constant, 8:36–37
 Lambda Cold Dark Matter, 8:37
 role of dwarf galaxies in end of cosmic Dark Ages, 7:26–27
Crab Nebula (M1; NGC 1952)
 images of, 5:50, 12:45
 observing, 12:45, 47
 origin of, 12:36–37
craters, fountain model of lunar crater origin, 12:38–42. *See also names of specific craters*
Crawford, David, 12:7
Crescent Nebula (NGC 6888)
 discovery of, 1:15
 image of, 1:15
 overview of, 1:15
 wide-field imaging of, 7:43
Crystal Ball Nebula (NGC 1514)
 images of, 6:55–56, 12:43
 observing, 12:45
CTB 1 (Abell 85) (supernova remnant), image of, 12:56–57
CTB 41. *See* Kepler's Supernova
Curiosity rover
 discovery of sulfur crystals, 11:7
 Southwest Research Institute's role, 5:37
Cyclone Global Navigation Satellite System (CYGNSS), Southwest Research Institute's role, 5:38
Cygnus X-1 (Cyg X-1) (binary system), 5:19, 23

D

DAMPE (Dark Matter Particle Explorer; Wukong), 2:25
Dark Doodad Nebula (molecular cloud)
 image of, 1:40
 observing, 1:40
 overview of, 1:40
dark energy
 development of understanding of, 8:19
 FLAMINGO project simulation, 2:9
 stability of and ratio of to matter, 3:51–52
dark matter
 development of understanding of, 8:18
 effect on solar system, 12:50–51
 FLAMINGO project simulation, 2:8–9
 stability of and ratio of to matter, 3:51–52
Dark Matter Particle Explorer (DAMPE; Wukong), 2:25
dark nebulae, observing, 10:22. *See also names of specific dark nebulae*
DART (Double Asteroid Redirection Test) mission, results of, 3:18–19, 6:10
DarkSky, Responsible Outdoor Lighting at Night (ROLAN) manifesto, 7:17
DAVINCI+ (Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging Plus) mission, plans for, 9:10
deep learning. *See* artificial intelligence
Devil Comet. *See* Comet 12P/Pons-Brooks
Didymos (binary asteroid system), 3:18–19
Dimorphos (asteroid moonlet), results of DART mission, 3:18–19, 6:10
Dinkinesh (152830 Dinkinesh) (asteroid), 2:8
dinosaurs, Chicxulub impact and extinction of, 2:9

Astronomy Magazine Article Subject Index 2024

Dish Network Corp., 3:12
DonaldJohanson (52246 DonaldJohanson) (asteroid), 2:8
Double Asteroid Redirection Test (DART) mission, results of, 3:18–19, 6:10
Double Cluster (NGC 869/84), observing, 3:48
double stars
 See also names of specific double stars
 colorful, 9:48
 observing deep-sky objects, 10:17–18
Dumbbell Nebula (M27), images of, 10:18, 12:25
dwarf galaxies
 See also names of specific dwarf galaxies
 behavior of black holes at center of, 11:10
 role of in end of cosmic Dark Ages, 7:26–27
dwarf planets. *See names of specific dwarf planets*
DwarfLab DWARF II smart telescope, 8:44–45
Dwight, Ed, 9:9
Dwingeloo 1 (barred spiral galaxy)
 discoveries regarding, 1:10
 image of, 1:10
 overview of, 1:10
Dwingeloo 2 (irregular galaxy), 1:10
Dysnomia (moon of Eris), studying composition of via interaction with parent body, 3:10

E

Eagle Nebula (M16)
 image of, 2:44
 observing, 2:44–45
Earth
 changes in current in upper ionosphere caused by GRB, 3:9
 changes to habitable zone, 3:25
 cooling of core, 3:24–25
 Giant Impact Hypothesis, 8:14
 perimeter of elliptical orbit, 11:53
 production of oxygen by polymetallic nodules on seafloor, 12:9
 threats to existence of, 3:16–25
Earth 2.0 (ET) mission, 2:25
eclipses
 lunar, 9:53
 moons of Jupiter, 12:48
 Safe Solar Viewer (SSV), 2:46–47
 solar, 2:16–17, 21, 46–47, 52, 57, 3:36–41, 4:8–27, 36–54, 56–58, 7:54–57, 9:15–23, 47
EELS (Exobiology Extant Life Surveyor) robot, 8:8–9
Egg Galaxy (NGC 2937), 11:7
Egg Nebula (protoplanetary nebula)
 image of, 1:16
 overview of, 1:16
80 Ursae Majoris (Alcor) (star), image of, 10:18
Einstein, Albert, Vesto Slipher and, 12:16–17
Einstein Cross (Huchra's Lens)
 discovery of, 1:51
 image of, 1:51
 observing, 1:51
 overview of, 1:51
Einstein Probe, 2:25
Elephant's Trunk Nebula (part of IC 1396), image of, 2:56
elliptical galaxies. *See names of specific elliptical galaxies*
Embryo Nebula (NGC 1333)
 image of, 6:55–56

Astronomy Magazine Article Subject Index 2024

- rogue planets, 12:7
- emission nebulae, observing deep-sky objects, 10:20. *See also names of specific emission nebulae*
- Engagement Ring (asterism), binocular observations of, 2:53
- Engle, Joe, 11:9
- Epsilon Eridani b (exoplanet), 1:19
- Epsilon Eridani (Ran) (star)
 - discoveries regarding, 1:19
 - image of, 1:19
 - overview of, 1:19
- Epsilon Indi Ab (exoplanet), 11:7
- Eris (dwarf planet), studying composition of via interaction with moon, 3:10
- ESA (European Space Agency), lunar mission control center in Germany, 6:9. *See also names of specific spacecraft and missions*
- ESO 257–19 (galaxy), image of, 9:58
- ESO 350–40. *See* Cartwheel Galaxy
- ESO 402–9 (spiral galaxy), image of, 10:58
- ESO 402–10 (spiral galaxy), image of, 10:58
- ESO 594–4. *See* Sagittarius Dwarf Irregular Galaxy
- ET (Earth 2.0) mission, 2:25
- Eta Carinae (binary system)
 - image of, 1:51
 - observing, 1:51
 - overview of, 1:51
- Euclid infrared space telescope
 - de-icing procedure, 7:9
 - discoveries in M87, 9:7
 - Horsehead Nebula, 2:7
 - mission of, 2:7
- Europa (moon of Jupiter)
 - carbon dioxide on, 2:9
 - oxygen production, 7:12
 - transit of, 12:48
- Europa Clipper spacecraft
 - bacterial detection, 7:9
 - scheduled launch window, 2:21
 - Southwest Research Institute’s role, 5:38–39
- European Space Agency (ESA), lunar mission control center in Germany, 6:9. *See also names of specific spacecraft and missions*
- Exobiology Extant Life Surveyor (EELS) robot, 8:8–9
- ExoMars Trace Gas Orbiter (TGO), spider-like features on Mars caused by geysers, 8:9
- exoplanets (extrasolar planets)
 - See also names of specific exoplanets*
 - collision of ice giants, 2:7
 - detecting using AI, 2:17
 - giant, orbiting tiny star, 3:10
 - JuMBOs, 3:26–27
 - orbiting red giant while retaining a puffy atmosphere, 10:7
 - rocky super-Earth with thick atmosphere, 9:13
 - rogue planets, 12:7
 - sand falling as rain, 3:9
 - six-planet resonant system, 3:8–9
 - sub-Neptunes, 3:8–9, 10
 - tidally locked, 7:7
 - warm Jupiters, 10:9
 - weather mapped on tidally-locked gas giant, 8:5
- extraterrestrial life
 - AI identifying samples produced by life or abiotic processes, 2:17
 - AI searching radio data for signs of, 2:17

Astronomy Magazine Article Subject Index 2024

- controversy surrounding IM1 and metallic spherules, 7:11
- Fermi paradox, 12:9
- martian rock containing organic compounds, 11:11
- Murchison Widefield Array, 12:7
- possibility of, 8:21
- searching for artificial greenhouse gases as sign of, 10:9
- theory that intelligent life chooses to avoid conflict over resources, 12:9
- extreme trans-Neptunian objects, orbits of, and evidence of Planet Nine, 9:9
- Eye of Sauron (NGC 4151) (Seyfert galaxy)
 - discoveries regarding, 1:8
 - image of, 1:8
 - overview of, 1:8

F

- false zodiacal light, discovery of, 7:13
- Fast Low-Ionization Emission Regions (FLIERS), 1:17
- fast radio bursts (FRBs)
 - See also names of specific fast radio bursts*
 - from compact group of merging galaxies, 5:12
 - from galaxies like the Milky Way, 10:9
- Federal Communications Commission (FCC), fine for failure to move dead satellite to safe orbit, 3:12
- Fermi paradox, 12:9
- field of view (FOV), 8:48
- 55 Cancri e (exoplanet), 9:13
- Fireman's Hat, The (feature on Moon), 7:36, 39
- 5 Ursae Minoris (star), 2:53
- 52246 DonaldJohanson (asteroid), 2:8
- FLAMINGO (Full-hydro Largescale structure simulations with All-sky Mapping for the Interpretation of Next Generation Observations) project, 2:8–9
- FLIERS (Fast Low-Ionization Emission Regions), 1:17
- Flying Ghost (NGC 520) (spiral galaxy pair)
 - discovery of, 1:18
 - image of, 1:18–19
 - observing, 1:18
 - overview of, 1:18
- focal length, 8:48
- Fornax A (NGC 1316) (elliptical galaxy), image of, 2:56
- Fornax Dwarf (elliptical dwarf galaxy)
 - discovery of, 1:37
 - image of, 1:37
 - overview of, 1:37
- 4 Ursae Minoris (star), 2:53
- 47 Tucanae (NGC 104) (globular cluster), image of, 10:17
- FOV (field of view), 8:48
- FRB 20220610A (fast radio burst), 5:12
- FRBs. *See fast radio bursts; names of specific fast radio bursts*
- FS Tau (binary system), image of, 7:7
- FU Orionis (variable star)
 - image of, 1:56
 - observing, 1:56
 - overview of, 1:56
- Full-hydro Largescale structure simulations with All-sky Mapping for the Interpretation of Next Generation Observations (FLAMINGO) project, 2:8–9

G

- Gaia BH1 (black hole), 5:20–25
- Gaia BH2 (black hole), 5:20–21, 24–25
- Gaia BH3 (black hole), 9:9

Astronomy Magazine Article Subject Index 2024

Gaia mission

- Gaia catalog and merger history, 8:22–27
- non-accreting black holes, 5:20–25

Gaia-Enceladus (Gaia Sausage) (dwarf galaxy), 8:24–25

galaxies

See also names of specific galaxies; names of specific types of galaxies

- detection of early massive galaxies, 2:20–21
- end of star formation in dead galaxies, 6:11
- mergers of, appearance after, 6:10
- mergers of, as possible source of odd radio circles, 10:8–9
- mergers of, central black holes and, 10:44–45
- mergers of, FRB from compact group, 5:12
- most distant known, 9:9
- observing at different distance ranges, 8:38–41
- observing deep-sky objects, 10:22–23
- primordial galactic gas cloud, 5:12
- smallest known satellite to Milky Way, 8:7

galaxy clusters. *See names of specific galaxy clusters*

Gamma Leonis Group (Hickson 44) (galaxy group)

- image of, 1:19
- observing, 1:19
- overview of, 1:19

gamma-ray bursts (GRBs)

- See also names of specific gamma-ray bursts*
- caused by star stretched around black hole and colliding with itself, 8:7
- causing changes in current in upper ionosphere, 3:9
- million times more luminous than whole galaxy, 3:7

Ganymede (moon of Jupiter), shadow transits, 12:48

GECAM (Gravitational Wave High-energy Electromagnetic Counterpart All-sky Monitor), 2:25

Gecko Nebula (LBN 437), image of, 2:57

gegenschein, discovery of, 7:13

Gemini supernova remnant, image of, 10:22

Geminid meteors, image of with aurora, 5:54

Ghosts of Procellarum (feature on Moon), 7:36, 39

Giant Impact Hypothesis, 8:14

Giant Magellan Telescope (GMT), 6:9

Gliese 411. *See* Lalande 21185

global warming. *See* climate change and global warming

globular clusters

See also names of specific globular clusters

- collisions of stars within, 3:53
- discovery of protoclusters in gravitationally-lensed galaxy, 10:9
- Gaia catalog and galactic merger history, 8:22–27
- map of in Milky Way, 8:25
- observing deep-sky objects, 10:19–20

GMT (Giant Magellan Telescope), 6:9

GN-z11 (galaxy), 5:9

Golden Handle, The (feature on Moon), 7:36, 39

Gomez's Hamburger (IRAS 18059– 3211) (protoplanetary nebula)

- discovery of, 1:42
- image of, 1:42
- observing, 1:42
- overview of, 1:42

gravitational lensing

- Cosmic Gems arc, 10:9
- first known example of, 1:10

Gravitational Wave High-energy Electromagnetic Counterpart All-sky Monitor (GECAM), 2:25

gravitational waves

Astronomy Magazine Article Subject Index 2024

- low frequency, 2:18–19
- mergers of, 6:51
- gravity, lettuce grown in microgravity prone to infections, 5:9
- GRB 191019A (gamma-ray burst), 8:7
- GRB 221009A (gamma-ray burst), 3:9
- GRB 230307A (gamma-ray burst), 3:7
- GRBs. *See* gamma-ray bursts; *names of specific gamma-ray bursts*
- Guardians, The (feature on Moon), 7:36, 38–39
- Gum 16. *See* Vela Supernova Remnant
- Gum Nebula
 - discovery of, 1:46
 - image of, 1:46
 - overview of, 1:46
- GW150914 (gravitational-wave merger), 6:51
- Gyulbudaghian's Nebula (HH 215) (Herbig-Haro object)
 - discovery of, 1:14
 - image of, 1:14
 - overview of, 1:14

H

- H α imaging. *See* hydrogen-alpha imaging
- HAKUTO-R Mission 1 robotic lander, crash landing of, 2:19
- Halley, Edmond
 - astronomer royal, 6:26–27
 - death of, 6:27
 - discovery of comet, 6:25
 - early years of, 6:24
 - magnetic fields, 6:25
 - Newton and, 6:25
 - overview of, 6:22–27
 - prime meridian, 6:26–27
 - travels of, 6:24–26
- Hamburger Galaxy (NGC 3628)
 - image of, 10:54–55
 - observing, 3:48
- Hard X-ray Modulation Telescope (HXMT), 2:25, 27
- Hartl-Dengel-Weinberger 3 (HDW 3) (planetary nebula), image of, 5:55
- Hawking's area theorem, 6:51
- HD 45166 (binary system), possible magnetar progenitor, 2:15
- HD 110067 (star), 3:8–9
- HD 142666 (star), 2:17
- HD 148937 (binary system), 7:12
- HD 163296 (star), 5:53
- HD 192163 (WR 136) (Wolf-Rayet star), 1:15
- HDW 3 (Hartl-Dengel-Weinberger 3) (planetary nebula), image of, 5:55
- Headlights, The (feature on Moon), 7:36–37
- Headphone Nebula (JE 1; PK164+31.1)
 - discoveries regarding, 1:9
 - image of, 1:9
 - overview of, 1:9
- Heart and Soul nebulae (IC 1805/48)
 - image of, 2:45
 - observing, 2:45
- Heart of the Moon (feature on Moon), 7:36, 38
- Helix Nebula (NGC 7293), image of, 12:27
- Hera spacecraft, scheduled launch date, 2:21
- Herbig-Haro (HH) objects. *See* names of specific Herbig-Haro objects
- Hercules Cluster (M13), image of, 12:27

Astronomy Magazine Article Subject Index 2024

- Hercules Galaxy Cluster (Abell 2151)
 - distance from Earth, 8:41
 - image of, 1:21
 - observing, 1:21, 8:41
 - overview of, 1:21
- Heron Galaxy (Arp 84; NGC 5394/95), image of, 9:55
- HH (Herbig-Haro) objects. *See names of specific Herbig-Haro objects*
- HH 211 (Herbig-Haro object), 2:9
- HH 215. *See* Gyulbudaghian's Nebula
- HH 797 (Herbig-Haro object), 5:26–27
- HH 909A (Herbig-Haro object), image of, 7:58
- Hickson 44. *See* Gamma Leonis Group
- Hickson 57. *See* Copeland's Septet
- Hill's Waterfall (feature on Moon), 7:36–37
- Hind's Variable Nebula (NGC 1555)
 - discoveries regarding, 1:20
 - image of, 1:20, 12:44
 - observing, 1:20, 12:45–46
 - overview of, 1:20
- HL Tauri (star), water vapor in protoplanetary disk, 6:7
- Hoag's Object (ring galaxy)
 - discovery of, 1:11
 - image of, 1:11
 - overview of, 1:11
- Homunculus Nebula, 1:51
- Horsehead Nebula (Barnard 33)
 - extreme close-up of photo-dissociation region in mane, 8:5
 - targeted by Euclid telescope, 2:7
- Horseshoe Nebula. *See* Swan Nebula
- HST. *See* Hubble Space Telescope
- Hubble, Edwin, Vesto Slipher and, 12:14–23
- Hubble constant and Hubble tension
 - JWST's confirmation of HST's findings, 6:9, 8:36–37
 - Slipher's role in discovering, 12:14–23
- Hubble flow, 7:51
- Hubble Space Telescope (HST)
 - capturing Hubble-like images, 6:48
 - Christmas Tree Galaxy Cluster, 3:12
 - cosmic expansion, 6:9
 - FRB from compact group of merging galaxies, 5:12
 - hydrogen gas in arms of Andromeda, 12:9
 - JWST's confirmation of findings on Hubble constant, 6:9, 8:36–37
 - processing data from, 5:43
 - switching to one gyroscope, 10:9
- Hubble's Variable Nebula (NGC 2261), image of, 5:55
- Huchra's Lens. *See* Einstein Cross
- HXMT (Hard X-ray Modulation Telescope), 2:25, 27
- Hyades (star cluster)
 - image of, 12:45
 - observing, 12:45–46
- hydrogen-alpha ($H\alpha$) imaging
 - Sun, 5:48
 - Triangulum Galaxy, 12:56–57

I

- IC 348 (star cluster), smallest known brown dwarf, 5:7
- IC 418. *See* Spirograph Nebula
- IC 443. *See* Jellyfish Nebula

Astronomy Magazine Article Subject Index 2024

IC 1185 (galaxy), 1:21
IC 1194A (galaxy), 1:21
IC 1396 (dark nebula)
 image of, 2:45
 observing, 2:45
IC 1805/48. *See* Heart and Soul nebulae
IC 2087 (reflection nebula)
 image of, 12:46
 observing, 12:45–46
IC 2602. *See* Southern Pleiades
IC 2944 (Running Chicken Nebula), images of, 5:58, 9:54
IC 2948 (reflection and emission nebula), image of, 9:54
IC 3568. *See* Lemon Slice Nebula
IC 4592 (Blue Horsehead Nebula), image of, 5:56–57
IC 4604 (reflection nebula), 1:41
IC 4605 (reflection nebula), image of, 10:57
IC 5070 (Pelican Nebula), wide-field imaging of, 7:44
IC 5146 (Cocoon Nebula), image of, 3:56–57
IC 5148 (Spare Tire Nebula), image of, 6:57
IceCube Neutrino Observatory, imaging the Milky Way via neutrinos, 2:20–21
IM-1 (Intuitive Machines 1; Odysseus) mission, overview of, 6:8–9
IM1 (suspected interstellar meteor), 7:11
IMAGE (Imager for Magnetopause-to-Aurora Global Exploration) mission, 5:37
Ingenuity drone, flight log, 5:10–11. *See also* Perseverance rover
InSight lander, evidence for subsurface water, 12:11
Integral Sign Galaxy (UGC 3697)
 discovery of, 1:13
 image of, 1:13
 overview of, 1:13
Intergalactic Wanderer (NGC 2419) (globular cluster)
 discovery of, 1:12
 image of, 1:12
 overview of, 1:12
International Lunar Research Station, 2:25
International Space Station (ISS)
 astronauts shelter in return vehicles due to danger from space debris, 11:7
 contract for vehicle to remove from orbit, 10:9
 longest spaceflight by US astronaut, 2:7
 space junk from, 7:9
Intuitive Machines 1 (IM-1; Odysseus) mission, overview of, 6:8–9
Io (moon of Jupiter)
 imaged by Large Binocular Telescope, 9:11
 long history of volcanism, 8:8
 transits, occultations, eclipses, and shadow transits, 12:48
IPHASX J194359.5+170901. *See* Necklace Nebula
IRAS 18059– 3211. *See* Gomez’s Hamburger
IRAS Vela Shell (molecular gas shell), image of, 6:55
Iris Nebula (LBN 487), image of, 10:56–57
irregular galaxies. *See names of specific irregular galaxies*
ispace, crashed lunar lander, 2:19
ISS. *See* International Space Station

J

J0613+52 (primordial galactic gas cloud), 5:12
J0931+0038 (star), 5:9
JADES-GS-z7-01-QU (galaxy), 6:11
JADES-GS-z14-0 (galaxy), 9:9
James Webb Space Telescope (JWST)

Astronomy Magazine Article Subject Index 2024

black holes merging, 10:44–45
carbon dioxide on Europa, 2:9
Christmas Tree Galaxy Cluster, 3:12
confirmation of HST’s findings on Hubble constant, 6:9, 8:36–37
Cosmic Gems arc, 10:9
dead galaxy, 6:11
difficulty in finding Planet X, 5:52
direct image of massive exoplanet, 11:7
dwarf galaxies’ role in end of cosmic Dark Ages, 7:26–27
early massive galaxies, 2:20–21
extreme close-up of Horsehead Nebula, 8:5
globular cluster NGC 6440, 9:36–37
HH 797, 5:26–27
jets emanating from HH 211, 2:9
JuMBOs, 3:26–27
Milky Way core, 3:7
most distant black hole seen in X-rays, 2:9
number of proposals for third cycle of observations, 9:13
origin of Crab Nebula, 12:36–37
Penguin and Egg galaxies, 11:7
processing images from, 9:38–41
protostars within Serpens Nebula, 11:36–37
rocky exoplanet with thick atmosphere, 9:13
rogue planets, 12:7
second anniversary of science operations, 11:7
smallest known brown dwarf, 5:7
SN 1987A, 6:11
star formation, 6:36–37
star formation in M82, 7:10
supermassive black holes in early universe, 5:8–9
weather mapped on tidally-locked gas giant exoplanet, 8:5
JE 1. *See* Headphone Nebula
Jellyfish Nebula (IC 443; Sh 2–248)
discoveries regarding, 1:27
images of, 1:27, 5:44, 9:56, 10:22
overview of, 1:27
Jewel Box Cluster (NGC 4755)
discoveries regarding, 1:50
image of, 1:50
observing, 1:50
overview of, 1:50
Jones 1 (PK104–29.1) (planetary nebula)
discovery of, 1:10
image of, 1:10
overview of, 1:10
JUICE (Jupiter ICy moons Explorer) mission, double flyby of Earth and Moon, 12:9
JuMBOs (Jupiter-Mass Binary Objects), discovered in Orion Nebula, 3:26–27
Juno spacecraft, Southwest Research Institute’s role, 5:37–38. *See also* Jupiter
Jupiter
See also names of moons orbiting; names of specific missions to
density of Jupiter’s Trojan asteroids versus main belt, 5:51
transits, occultations, eclipses, and shadow transits of moons, 12:48
Jupiter ICy moons Explorer (JUICE) mission, double flyby of Earth and Moon, 12:9
Jupiter-Mass Binary Objects (JuMBOs), discovered in Orion Nebula, 3:26–27
JWST. *See* James Webb Space Telescope

K

Kapteyn’s Star (red subdwarf)

Astronomy Magazine Article Subject Index 2024

- discovery of, 1:48
 - image of, 1:48
 - overview of, 1:48
 - Keck Observatory, exoplanet with puffy atmosphere orbiting red giant, 10:7
 - Keenan's System (Arp 104; NGC 5216/18)
 - discoveries regarding, 1:17
 - image of, 1:17
 - overview of, 1:17
 - Kepler space telescope, TESS versus, 8:51–52
 - Kepler's Supernova (CTB 41)
 - discovery of, 1:46
 - image of, 1:46
 - overview of, 1:46
 - Kochab (Beta Ursae Minoris) (star), 2:53
 - Kraken (progenitor dwarf galaxy), 8:25
- L**
- Lagoon Nebula (M8), images of, 5:44–45, 10:18–19, 12:24–25
 - Lalande 21185 (red dwarf)
 - discoveries regarding, 1:20
 - image of, 1:20
 - observing, 1:20
 - overview of, 1:20
 - Lambda Orionis Nebula/Ring, observing, 2:43
 - Lambert γ (Mons Undset) (feature on Moon), 5:14
 - Large Binocular Telescope (LBT), image of Io taken with SHARK-VIS camera, 9:11
 - Large Magellanic Cloud (LMC), circumstellar disk detected, 3:7
 - lasers, high-bandwidth deep-space communications test, 5:7
 - LBN 437 (Gecko Nebula), image of, 2:57
 - LBN 487 (Iris Nebula), image of, 10:56–57
 - LBN 867 (Raspberry Nebula), image of, 2:58
 - LBT (Large Binocular Telescope), image of Io taken with SHARK-VIS camera, 9:11
 - Leavitt law (period-luminosity relationship), 7:52
 - LEDA 1142006 (galaxy), 1:25
 - LEDA 3110345 (galaxy), 1:25
 - LEDA 4540064 (galaxy), 1:25
 - Legacy Survey of Space and Time (LSST) camera, 6:17, 8:10, 11:9
 - LEGO, 3D-printed interlocking bricks made from meteorite dust, 10:7
 - Lemon Slice Nebula (IC 3568)
 - image of, 1:38
 - overview of, 1:38
 - lenticular galaxies. *See names of specific lenticular galaxies*
 - Leo I (Regulus Dwarf; PGC 29488; UGC 5470) (dwarf spheroidal galaxy)
 - discovery of, 1:26
 - image of, 1:26
 - observing, 1:26
 - overview of, 1:26
 - Leo Triplet (galaxy group), observing, 3:48
 - LFBOT (Luminous Fast Blue Optical Transient) objects, 3:10
 - LHS 3154 b (exoplanet), 3:10
 - LHS 3154 (red dwarf), 3:10
 - LHS 3844 b (exoplanet), 7:7
 - Liebig Wall, The (feature on Moon), 7:36–37
 - life, origin of, magnetic field strength and diversification of multicellular animals, 9:9. *See also* extraterrestrial life
 - light
 - Arizona's dark sky efforts, 7:15, 18–19, 22
 - better outdoor lighting design, 7:20
 - Bortle scale, 7:18

Astronomy Magazine Article Subject Index 2024

correlated color temperature (CCT), 7:17, 23
cosmological redshift, 12:17
DarkSky's Responsible Outdoor Lighting at Night (ROLAN), 7:17
death of dark-sky movement pioneer David Crawford, 12:7
effect of black holes on massless photons, 9:52–53
effects of artificial light at night (ALAN), 7:14–23
expected visible color through 10-inch telescopes, 10:53
false zodiacal light, 7:13
gegenschein, 7:13
LEDs, 7:17–18
light pollution, 7:14–23, 48
light pollution reduction (LPR) filters, 7:48, 53
magnitude system, 8:42–43
proximity during conjunctions causing fainter objects to appear brighter, 12:12
rainbows, 11:25–27
solar eclipse-related phenomena, 4:16–18, 9:17
spectral lines and associated compounds, 8:52
zodiacal light, 7:13
light echoes, 8:50–51
light pillars, 6:43
Little Dumbbell Nebula (M76), image of, 8:58
Little Gem Nebula (NGC 6818), 1:39
LMC (Large Magellanic Cloud), circumstellar disk detected, 3:7
Long March 5 rocket, 2:26
Long March 9 rocket, 2:25
Long March 10 rocket, 2:24
Lost Pearl Galaxy. *See* Mirach's Ghost
LRL 54361 (emission nebula), 5:27
LSST (Legacy Survey of Space and Time) camera, 6:17, 8:10, 11:9
Lucy spacecraft, Dinkinesh and companion contact binary, 2:8
Luminous Fast Blue Optical Transient (LFBOT) objects, 3:10
Luna 25 mission, 2:19
Luna 26 mission, 2:19
Luna 27 mission, 2:19
lunar eclipses, reddish color rather than completely dark, 9:53
Lunar Good-Luck Charm, The (feature on Moon), 7:36–37
Lunar S, The (feature on Moon), 7:36, 38
Lunar X, The (feature on Moon), 7:36, 38
Lynds 1688 (dark nebula), 1:41
Lynds 1689 (dark nebula), 1:41

M

M1. *See* Crab Nebula
M1–67 (Sh 2–80) (planetary nebula)
 discovery of, 1:24–25
 image of, 1:24–25
 overview of, 1:24–25
M2 (NGC 7089) (globular cluster), 8:23–24
M4 (globular cluster), image of, 12:26
M8 (Lagoon Nebula), images of, 5:44–45, 10:18–19, 12:24–25
M13 (Hercules Cluster), image of, 12:27
M15 (NGC 7078) (globular cluster)
 image of, 1:20
 observing, 1:20
 overview of, 1:20
M16. *See* Eagle Nebula
M17. *See* Swan Nebula
M20 (Trifid Nebula), images of, 5:44–45, 10:18–19

Astronomy Magazine Article Subject Index 2024

- M27 (Dumbbell Nebula), images of, 10:18, 12:25
- M31. *See* Andromeda Galaxy
- M33 (Pinwheel galaxy; Triangulum Galaxy), hydrogen-alpha image of, 12:56–57
- M42. *See* Orion Nebula
- M44 (Beehive Cluster), conjunctions of Venus and Mars with, 12:12
- M45. *See* Pleiades star cluster
- M51. *See* Whirlpool Galaxy
- M54 (NGC 6715) (globular cluster), 8:26–27
- M56 (NGC 6779) (globular cluster), 8:24–25
- M57 (Ring Nebula), observing central star of, 8:46
- M60 (NGC 4649) (elliptical galaxy), image of, 10:20–21
- M67 (open cluster)
 - discovery of, 1:36
 - image of, 1:36
 - observing, 1:36
 - overview of, 1:36
- M74 (Phantom Galaxy), 6:37
- M75 (NGC 6864) (globular cluster), 8:24, 26
- M76 (Little Dumbbell Nebula), image of, 8:58
- M78 (reflection nebula)
 - Euclid’s discoveries in, 9:7
 - images of, 10:14–15, 11:58
- M79 (NGC 1904) (globular cluster), 8:24–26
- M81. *See* Bode’s Galaxy
- M82. *See* Cigar Galaxy
- M83. *See* Southern Pinwheel Galaxy
- M87 (elliptical galaxy)
 - image of, 1:56
 - observing, 1:56
 - overview of, 1:56
 - spin of central black hole, 2:7
- M87* (black hole)
 - first image of a black hole, 1:56, 5:18
 - jet emanating from, 7:8–9
 - magnetic field, 7:8–9
- M95 (barred spiral galaxy), image of, 10:21
- M97 (Owl Nebula), image of, 10:54–55
- M100. *See* Mirror Galaxy
- M104. *See* Sombrero Galaxy
- Maat Mons (feature on Venus), evidence of volcanic activity, 2:14–15
- machine learning (ML). *See* artificial intelligence
- MACS0416 (Christmas Tree Galaxy Cluster), 3:12
- Maffei 1 (elliptical galaxy)
 - discovery of, 1:14
 - image of, 1:14
 - overview of, 1:14
- Maffei 2 (barred spiral galaxy)
 - discovery of, 1:14
 - image of, 1:14
 - overview of, 1:14
- Magellan mission
 - evidence of lava flows detected by, 9:10
 - possible volcanic eruption detected by, 2:14–15
- magnetars
 - circularly-polarized radio waves, 8:5
 - Wolf-Rayet star possible progenitor of, 2:15
- magnetic fields
 - of black holes, 7:8–9

Astronomy Magazine Article Subject Index 2024

- of Earth, strength of and diversification of multicellular animals, 9:9
- Halley's study of, 6:25
- of Sun, magnetic reconnection and, 11:18–19
- of Sun, produced at shallow depth, 9:9
- of Sun, producing solar winds, 11:22–23
- magnetic reconnection, 11:18–19
- magnitude system
 - apparent magnitude, 8:43
 - combining magnitude, 8:43
 - differences in, 8:43
 - limiting visual magnitude, 8:43
 - origin of, 8:42–43
- Mare Tranquillitatis (feature on Moon), 11:8–9
- Marius Hills, The (feature on Moon), 7:36, 38
- Markarian 205 (quasar)
 - discoveries regarding, 1:16
 - image of, 1:16
 - overview of, 1:16
- Mars
 - See also names of moons orbiting; names of specific missions to*
 - Cheyava Falls, 11:11
 - conjunction of with Beehive cluster, 12:12
 - disappearance of water from, 8:15
 - eroded volcano and possible buried glacier on, 8:7
 - evidence for subsurface water, 12:11
 - ice deposits on, 10:7
 - lack of dust-removal systems for solar panels on landers/rovers, 2:54–55
 - Noctis Labyrinthus, 8:7
 - number of basket-ball sized meteorites landing annually, 10:11
 - Olympus Mons, 10:7
 - oxygen extracted from air via MOXIE device, 3:10
 - potential of hardy desert moss for terraforming, 11:9
 - pure sulfur crystals on, 11:7
 - releasing metallic nanorods into atmosphere to warm planet, 12:9
 - rock containing organic compounds, 11:11
 - spider-like features caused by geysers, 8:9
- Mars 2020 mission. *See* Perseverance rover
- Mars Sample Return (MSR) mission, need for fresh ideas regarding, 8:10
- Martian Moons Exploration (MMX) mission, scheduled launch date, 2:21
- Mattingly, Ken, 3:7
- Mayall's Object (Arp 148; MCG +7–23–19) (galaxy collision)
 - discovery of, 1:15
 - image of, 1:15
 - overview of, 1:15
- MB 3 (dwarf spheroidal galaxy), 1:10
- MCG +7–23–19. *See* Mayall's Object
- Medusa Nebula (Abell 21; Sh 2–274)
 - discovery of, 1:26
 - image of, 1:26
 - observing, 1:26
 - overview of, 1:26
- Melotte 20. *See* Alpha Persei Cluster
- Melotte 111. *See* Coma Star Cluster
- Menzel 3. *See* Ant Nebula
- Merope Nebula (NGC 1435), observing, 12:44–45
- Merrill's Star (WR 124) (Wolf-Rayet star)
 - discovery of, 1:24–25
 - image of, 1:24–25

Astronomy Magazine Article Subject Index 2024

- overview of, 1:24–25
- Messier catalog, observing objects missing from, 3:48. *See also names of specific Messier objects*
- meteor showers
 - See also names of specific meteor showers*
 - Geminids, 5:54
 - Perseids, 2:36–41, 3:42–43, 57, 11:56–57
- meteorites
 - number of basket-ball sized meteorites that land on Mars annually, 10:11
 - sinking in Antarctic ice, 8:7
 - 3D-printed interlocking bricks made from, 10:7
- meteors
 - controversy surrounding IM1, 7:11
 - image of with aurora over Yosemite, 11:54
- Methuselah Nebula (MWP 1), image of, 9:55
- Mice Galaxies (Arp 242; NGC 4676 A/B)
 - image of, 1:55
 - observing, 1:55
 - overview of, 1:55
- microbes, lettuce grown in microgravity prone to infections, 5:9
- microlensing. *See gravitational lensing*
- microquasars, first discovered, 1:45
- Milky Way Galaxy
 - See also Sagittarius A**
 - ancient star orbiting central black hole, 5:9
 - death rate of stars in, 5:50–51
 - future collision with Andromeda, 3:25, 8:16
 - Gaia catalog and merger history, 8:22–27
 - galactic center, 1:47
 - image of over Bryce Canyon, 12:55
 - image of over Death Valley, 10:54
 - image of over India, 9:55
 - image of over Vancouver Island starfish, 12:57
 - image of over volcano, 3:54
 - image of star-forming region near core, 3:7
 - imaging via neutrinos, 2:20–21
 - map of globular and open clusters in, 8:25
 - smallest known runaway star, 12:9
 - smallest known satellite galaxy, 8:7
 - wide-field imaging of, 6:38–43, 7:40–41
 - zone of avoidance, 1:14
- Mimas (moon of Saturn), subsurface ocean, 6:7
- Mirach's Ghost (Lost Pearl Galaxy; NGC 404)
 - discoveries regarding, 1:22
 - image of, 1:22
 - observing, 1:22
 - overview of, 1:22
- Mirach's Goblin (dwarf spheroidal galaxy), 1:22
- Mirfak (Alpha Persei) (star), 1:8
- Mirror Galaxy (M100)
 - distance from Earth, 8:40
 - observing, 8:39
- Mizar (Zeta Ursae Majoris) (star)
 - image of, 10:18
 - visual acuity and, 1:56
- ML (machine learning). *See artificial intelligence*
- MMX (Martian Moons Exploration) mission, scheduled launch date, 2:21
- molecular clouds, possibility that solar system once passed through, 11:9
- Mons Undset (Lambert γ) (feature on Moon), 5:14

Astronomy Magazine Article Subject Index 2024

Moon (Earth's)

See also names of specific missions to

cancelation of VIPER mission, 12:8–9

Coordinated Lunar Time (LTC), 8:10

eclipses of, 9:53

enhanced selenochromatic image of, 12:54

ESA mission control center in Germany, 6:9

evidence entire surface was once covered in magma, 12:7

fountain model of crater origin, 12:38–42

Giant Impact Hypothesis, 8:14

goal of Japanese national as first non-American on Moon, 8:7

image of with Venus, 3:55

lunar halos, 11:27

lunar pits leading to caves and lava tubes, 11:8–9

Mare Tranquillitatis, 11:8–9

Mons Undset, 5:14

moonbows, 11:27

naming of features on, 7:36

nicknames of lesser-known features, 7:36–39

observation of terminator through binoculars, 11:52–53

plaster models of surface features, 12:38–42

proposal to store genetic samples on, 11:9

Psyche not associated with collision that formed, 6:53

theories on formation of, 8:14

3D-printed interlocking bricks made from lunar soil, 10:7

moons. *See names of specific moons*

MSR (Mars Sample Return) mission, need for fresh ideas regarding, 8:10

multiple-star systems. *See names of specific multiple-star systems*

Murchison Widefield Array, 12:7

MW1 (integrated flux nebula), image of, 9:57

MWP 1 (Methuselah Nebula), image of, 9:55

N

NANOGrav (North American Nanohertz Observatory for Gravitational Waves), 2:18–19

NASA (National Aeronautics and Space Administration)

See also names of specific spacecraft and missions

Commercial Lunar Payload Services (CLPS) initiative, 6:9

snake-like robot developed by, 8:8–9

team assigned to help government understand UAPs, 2:9

National Science Foundation (NSF), recommended funding cap for extremely large telescopes, 6:9

near-Earth objects (NEOs). *See names of specific near-Earth objects*

nebulae. *See names of specific nebulae; names of specific types of nebulae*

Necklace Nebula (IPHASX J194359.5+170901; PN G054.2–03.4)

discovery of, 1:23

image of, 1:23

overview of, 1:23

Needle Galaxy (NGC 4565), observing, 3:48

NEOs (near-Earth objects). *See names of specific near-Earth objects*

NEOWISE (Comet C/2020 F3), wide-field imaging of, 7:42

Neptune

See also names of moons orbiting

natural color of, 6:9

new moons discovered, 6:9

Nereides Nebula (supernova remnant), 11:11

neutrinos

imaging the Milky Way by means of, 2:20–21

overview of, 11:16–17

neutron stars, verification of, within core of SN 1987A, 6:11

Astronomy Magazine Article Subject Index 2024

- New General Catalogue (NGC), 9:50–51. *See also specific NGC objects*
- New Horizons mission, Southwest Research Institute’s role, 5:37–38. *See also* Pluto
- Newton, Isaac, Halley and, 6:25
- NGC 55. *See* Southern Cigar Galaxy
- NGC 104 (47 Tucanae) (globular cluster), image of, 10:17
- NGC 134 (barred spiral galaxy), 10:25, 27
- NGC 147 (dwarf elliptical galaxy)
 - discovery of, 1:11
 - image of, 1:11
 - overview of, 1:11
- NGC 150 (barred spiral galaxy), 10:26
- NGC 185 (dwarf elliptical galaxy)
 - discovery of, 1:11
 - image of, 1:11
 - overview of, 1:11
- NGC 188 (star cluster), 2:53
- NGC 247 (spiral galaxy), 1:43
- NGC 253 (Sculptor Galaxy; Silver Coin Galaxy; Silver Dollar Galaxy; Caldwell 65), 10:25–26
- NGC 281 (Pac-Man Nebula), image of, 5:56
- NGC 288 (globular cluster), 10:26–27
- NGC 300. *See* Southern Pinwheel Galaxy
- NGC 404. *See* Mirach’s Ghost
- NGC 520. *See* Flying Ghost
- NGC 541 (dwarf galaxy), 1:50
- NGC 613 (spiral galaxy), 10:27
- NGC 869/84 (Double Cluster), observing, 3:48
- NGC 1023 (Arp 135) (barred lenticular galaxy)
 - discoveries regarding, 1:9
 - image of, 1:9
 - overview of, 1:9
- NGC 1023A (irregular galaxy), 1:9
- NGC 1275. *See* Perseus A
- NGC 1300 (barred spiral galaxy)
 - distance from Earth, 8:41
 - observing, 8:39
- NGC 1316 (Formax A) (elliptical galaxy), image of, 2:56
- NGC 1317 (spiral galaxy), image of, 2:56
- NGC 1333. *See* Embryo Nebula
- NGC 1360 (Robin’s Egg Nebula), image of, 11:56
- NGC 1365 (barred spiral galaxy)
 - distance from Earth, 8:41
 - observing, 8:39–40
- NGC 1376 (spiral galaxy)
 - distance from Earth, 8:41
 - observing, 8:40
- NGC 1435 (Merope Nebula), observing, 12:44–45
- NGC 1499 (California Nebula), wide-field imaging of, 6:40
- NGC 1514. *See* Crystal Ball Nebula
- NGC 1554 (Struve’s Lost Nebula), 1:20
- NGC 1555. *See* Hind’s Variable Nebula
- NGC 1647. *See* Pirate Moon Cluster
- NGC 1672 (barred spiral galaxy), 6:37
- NGC 1746 (open cluster)
 - image of, 12:46
 - observing, 12:45–47
- NGC 1807 (open cluster), observing, 12:45, 47
- NGC 1817 (open cluster), observing, 12:45, 47
- NGC 1904 (M79) (globular cluster), 8:24–26

Astronomy Magazine Article Subject Index 2024

- NGC 1952. *See* Crab Nebula
- NGC 2070 (Tarantula Nebula), image of, 5:43
- NGC 2071 (nebula), 9:7
- NGC 2170 (Angel Nebula), image of, 5:54
- NGC 2237/38/39. *See* Rosette Nebula
- NGC 2261 (Hubble's Variable Nebula), image of, 5:55
- NGC 2359. *See* Thor's Helmet
- NGC 2403 (spiral galaxy)
 - distance from Earth, 8:40
 - observing, 8:39
- NGC 2419. *See* Intergalactic Wanderer
- NGC 2467 (Skull and Crossbones Nebula), image of, 3:55
- NGC 2623 (galaxy merger), 8:22–23
- NGC 2626 (nebula), image of, 3:56
- NGC 2736. *See* Pencil Nebula
- NGC 2906 (spiral galaxy)
 - distance from Earth, 8:41
 - observing, 8:40
- NGC 2936 (Penguin Galaxy), 11:7
- NGC 2937 (Egg Galaxy), 11:7
- NGC 3034. *See* Cigar Galaxy
- NGC 3077 (elliptical galaxy), image of, 5:43
- NGC 3079 (barred spiral galaxy)
 - discovery of, 1:10
 - image of, 1:10
 - overview of, 1:10
- NGC 3166 (galaxy), image of, 9:54
- NGC 3169 (galaxy), image of, 9:54
- NGC 3185 (barred spiral galaxy), 1:19
- NGC 3187 (spiral galaxy), 1:19
- NGC 3190 (spiral galaxy), 1:19
- NGC 3193 (elliptical galaxy), 1:19
- NGC 3372 (Carina Nebula), image of, 2:42
- NGC 3628. *See* Hamburger Galaxy
- NGC 3745 (galaxy), 1:24
- NGC 3746 (galaxy), 1:24
- NGC 3748 (galaxy), 1:24
- NGC 3750 (galaxy), 1:24
- NGC 3751 (galaxy), 1:24
- NGC 3753 (galaxy), 1:24
- NGC 3754 (galaxy), 1:24
- NGC 4038/39. *See* Antennae Galaxies
- NGC 4151. *See* Eye of Sauron
- NGC 4274 (barred spiral galaxy), image of, 6:54
- NGC 4319 (barred spiral galaxy)
 - discoveries regarding, 1:16
 - image of, 1:16
 - overview of, 1:16
- NGC 4485 (galaxy)
 - discovery of, 1:12
 - image of, 1:12
 - overview of, 1:12
- NGC 4490. *See* Cocoon Galaxy
- NGC 4565 (Needle Galaxy), observing, 3:48
- NGC 4649 (M60) (elliptical galaxy), image of, 10:20–21
- NGC 4676 A/B. *See* Mice Galaxies
- NGC 4753 (galaxy), results of merger with smaller galaxy, 6:10
- NGC 4755. *See* Jewel Box Cluster

Astronomy Magazine Article Subject Index 2024

NGC 4874 (elliptical galaxy), image of, 12:58
NGC 4889 (elliptical galaxy), image of, 12:58
NGC 5128 (Centaurus A) (elliptical galaxy), images of, 6:55, 11:55
NGC 5139 (Omega Centauri), evidence for intermediate-mass black hole in, 12:10
NGC 5189. *See* Spiral Planetary Nebula
NGC 5216/18. *See* Keenan's System
NGC 5264 (dwarf galaxy), 11:10
NGC 5394/95 (Heron Galaxy; Arp 84), image of, 9:55
NGC 5676 (flocculent spiral galaxy)
 distance from Earth, 8:41
 observing, 8:40
NGC 6027 (spiral galaxy), 1:16
NGC 6027A (spiral galaxy), 1:16
NGC 6027B (lenticular galaxy), 1:16
NGC 6027C (barred spiral galaxy), 1:16
NGC 6027D (barred spiral galaxy), 1:16
NGC 6027E (tidal trail), 1:16
NGC 6045 (galaxy), 1:21
NGC 6047 (elliptical galaxy), 1:21
NGC 6055 (galaxy), 1:21
NGC 6056 (galaxy), 1:21
NGC 6061 (galaxy), 1:21
NGC 6164/65 (nebula), 7:12
NGC 6231. *See* Northern Jewel Box Cluster
NGC 6302 (Bug Nebula), 1:40
NGC 6397 (globular cluster), 3:53, 54
NGC 6440 (globular cluster), 9:36–37
NGC 6537. *See* Red Spider Nebula
NGC 6715 (M54) (globular cluster), 8:26–27
NGC 6745 (irregular galaxy)
 distance from Earth, 8:41
 observing, 8:40
NGC 6779 (M56) (globular cluster), 8:24–25
NGC 6818 (Little Gem Nebula), 1:39
NGC 6822. *See* Barnard's Galaxy
NGC 6823 (open cluster), image of, 11:55
NGC 6826. *See* Blinking Planetary Nebula
NGC 6864 (M75) (globular cluster), 8:24, 26
NGC 6888. *See* Crescent Nebula
NGC 6914 (reflection nebula), image of, 12:55
NGC 7000. *See* North America Nebula
NGC 7009. *See* Saturn Nebula
NGC 7023 (open cluster), image of, 10:56–57
NGC 7078. *See* M15
NGC 7089 (M2) (globular cluster), 8:23–24
NGC 7252. *See* Atoms for Peace Galaxy
NGC 7293 (Helix Nebula), image of, 12:27
NGC 7317/18A/18B/19/20. *See* Stephan's Quintet
NGC 7635 (Bubble Nebula), image of, 11:56–57
NGC 7662 (Blue Snowball) (planetary nebula), image of, 10:53
NGC 7727 (galaxy collision), 3:12
NGC 7762 and Sh 2–170 (Question Mark Nebula), image of, 5:45
NGC 7793 (Bond's Galaxy), 10:24–26
NGC 7822 (emission nebula), image of, 11:50
Ninja Star, The (feature on Moon), 7:36, 39
Nishimura (Comet C/2023 P1), 2:16
Noctis Labyrinthus (feature on Mars), 8:7
North America Nebula (NGC 7000)

Astronomy Magazine Article Subject Index 2024

Morehouse's dark ring, 10:12
wide-field imaging of, 7:44
North American Nanohertz Observatory for Gravitational Waves (NANOGrav), 2:18–19
Northern Jewel Box Cluster (NGC 6231)
 image of, 1:39
 observing, 1:39
 overview of, 1:39
novae. *See* supernovae; *names of specific novae*
Novaya Zemlya effect, 3:14
NSF (National Science Foundation), recommended funding cap for extremely large telescopes, 6:9

O

observatories, first national observatory of Kosovo, 11:9. *See also names of specific observatories*
occultations
 defined, 12:48
 moons of Jupiter, 12:48
odd radio circles (ORCs), galactic mergers as possible source of, 10:8–9. *See also names of specific odd radio circles*
Odysseus lunar lander, mission overview, 6:8–9
Olympus Mons (feature on Mars), ice deposits on, 10:7
Omega Centauri (NGC 5139), evidence for intermediate-mass black hole in, 12:10
Omega Nebula. *See* Swan Nebula
118 Tauri (double star)
 image of, 12:47
 observing, 12:45, 47
101955 Bennu (asteroid), history of water on parent body of, 10:10
152830 Dinkinesh (asteroid), 2:8
11/2017 U1. *See* 'Oumuamua
open clusters
 See also names of specific open clusters
 map of in Milky Way, 8:25
 observing deep-sky objects, 10:18–19
ORC 1 (odd radio circle), 10:9
ORCs (odd radio circles), galactic mergers as possible source of, 10:8–9. *See also names of specific odd radio circles*
OregonRocketry, 11:44–47
Origins, Spectral Interpretation, Resource Identification, Security-APophis Explorer (OSIRIS-APEX) mission, 2:15
Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer mission. *See* OSIRIS-REx mission
Orion (constellation), wide-field imaging of, 7:45
Orion Molecular Cloud, image of, 5:55
Orion Nebula (M42)
 images of, 5:42, 7:53
 JuMBOs, 3:26–27
 wide-field imaging of, 7:42
OSIRIS-APEX (Origins, Spectral Interpretation, Resource Identification, Security-APophis Explorer) mission, 2:15
OSIRIS-REx mission
 See also OSIRIS-APEX mission
 analysis of sample returned by, 2:14–15
 drogue parachute failure, 3:9
 name change and new mission, 2:15
 sample return, 2:14
'Oumuamua (11/2017 U1) (interstellar object)
 composition of, 6:14–15
 light curve, 6:14–15
 overview of, 6:12–21
 proposed missions to 'Oumuamua and similar objects, 6:16–19
 trajectory of, 6:16
Owl Nebula (M97), image of, 10:54–55
oxygen
 carbon-nitrogen-oxygen (CNO) cycle, 11:16

Astronomy Magazine Article Subject Index 2024

extracted from martian air, 3:10
production of by polymetallic nodules on seafloor, 12:9
production of on Europa, 7:12

P

P Cygni (blue variable star)
 discovery of, 1:49
 image of, 1:49
 overview of, 1:49
Pac-Man Nebula (NGC 281), image of, 5:56
Pandora's Cluster (Abell 2744), image of, 7:27
Particle Physics Project Prioritization Panel (P5), 3:9
Pease 1 (planetary nebula)
 image of, 1:20
 observing, 1:20
 overview of, 1:20
Pelican Nebula (IC 5070), wide-field imaging of, 7:44
Pencil Nebula (NGC 2736)
 image of, 1:37
 observing, 1:37
 overview of, 1:37
Penguin Galaxy (NGC 2936), 11:7
Penzias, Arno, 5:9
Peregrine Mission 1, 6:9
Perseid meteors
 essay contest winner, 3:42–43
 image of over desert with man holding astrolabe, 11:56–57
 image of trail with Andromeda, 3:57
 viewing in Turkey, 2:36–41
Perseus A (NGC 1275) (elliptical galaxy)
 discoveries regarding, 1:14–15
 image of, 1:14–15
 overview of, 1:14–15
Perseus Moving Group. *See* Alpha Persei Cluster
Perseverance rover (Mars 2020)
 Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE), 3:10
 need for fresh ideas for sample return mission, 8:10
 oxygen extracted from martian air, 3:10
 rock containing organic compounds, 11:11
PG 1159 (pre-degenerate) stars, 1:26
PG 1634+706 (quasar)
 image of, 1:41
 observing, 1:41
 overview of, 1:41
PGC 29488. *See* Leo I
PGC 36723 (spiral galaxy), 1:24
PGC 36733 (spiral galaxy), 1:24
PGC 36742 (spiral galaxy), 1:24
PGC 59061 (lenticular galaxy), 1:12
PGC 59062 (lenticular galaxy), 1:12
PGC 59065 (lenticular galaxy), 1:12
PGC 69457 (galaxy), 1:51
PGC 84720 (lenticular galaxy), 1:21
PHANGS (Physics at High Angular resolution in Nearby GalaxieS) collaboration, 6:36
Phantom Galaxy (M74), 6:37
Phoenix (TIC 365102760 b) (exoplanet), 10:7
photons, effect of black holes on, 9:52–53
Pinwheel galaxy (Triangulum Galaxy; M33), hydrogen-alpha image of, 12:56–57

Astronomy Magazine Article Subject Index 2024

- Pipe Nebula (B59/65/66/67/72/77/78)
 - images of, 2:45, 10:20
 - observing, 2:44
- Pirate Moon Cluster (NGC 1647)
 - image of, 12:44–45
 - observing, 12:46
- PK104–29.1. *See* Jones 1
- Planck temperature, 7:51
- Planet Nine (Planet X)
 - difficulty in finding, 5:52
 - orbits of extreme trans-Neptunian objects and, 9:9
- planetary nebulae, observing, 10:21. *See also names of specific planetary nebulae*
- planets
 - See also exoplanets; names of specific planets*
 - age of, in solar system, 5:53
 - consumed by stars, 7:9
 - order of formation, in solar system, 5:53
- Pleiades star cluster (Seven Sisters star cluster; M45)
 - images of, 10:23, 12:47
 - observing, 12:44–45
 - wide-field imaging of, 6:40
- Pluto
 - See also* New Horizons mission
 - Arizona’s official planet, 7:7
 - Sputnik Planitia, 8:5
 - viewing with backyard telescopes, 12:51–52
- PN G054.2–03.4. *See* Necklace Nebula
- PN G158.9+17.8. *See* Purgathofer-Weinberger 1
- Polarimeter to Unify the Corona and Heliosphere (PUNCH) mission, Southwest Research Institute’s role, 5:39
- Polaris (Alpha Ursae Minoris) (star), binocular observations of, 2:53
- Pragyan rover, 2:18, 12:7
- prime meridian, 6:26–27
- Project Lyra, 6:15, 17–18
- Propus (star), image of, 10:22
- protoplanetary disks
 - AI searching images for exoplanets, 2:17
 - water vapor in disk around HL Tauri, 6:7
- protostars
 - alignment of stars that formed together, 11:36–37
 - jets emanating from, 2:9
- PSR J0538+2817 (pulsar), 1:21
- Psyche (16 Psyche) (asteroid)
 - launch of mission to, 2:9
 - not associated with Moon-forming collision, 6:53
- Psyche mission
 - high-bandwidth deep-space communications test, 5:7
 - launch of, 2:9
- pulsars, gravitational waves produced by, 2:18–19. *See also names of specific pulsars*
- PUNCH (Polarimeter to Unify the Corona and Heliosphere) mission, Southwest Research Institute’s role, 5:39
- Purgathofer-Weinberger 1 (PuWe 1; PN G158.9+17.8) (planetary nebula)
 - discovery of, 1:18
 - images of, 1:18, 3:55
 - observing, 1:18
 - overview of, 1:18
- PV Cephei (star), 1:14

Q

- Q0957+561. *See* Twin Quasar

Astronomy Magazine Article Subject Index 2024

Q2237+0305 (quasar), 1:51
Qianfan satellite constellation, launch of first satellites, 12:9
Quantum Experiments at Space Scale (QUESS) spacecraft, 2:25
quasars
 See also names of specific quasars
 brightest, 1:18
 earliest discovered, 1:18
 first microquasar discovered, 1:45
Queqiao 2 lunar relay satellite, 2:26
QUESS (Quantum Experiments at Space Scale) spacecraft, 2:25
Question Mark Nebula (NGC 7762 and Sh 2–170), image of, 5:45

R

radio astronomy
 See also fast radio bursts
 call for protection of lunar farside from interference, 7:9
 odd radio circles, 10:8–9
Railroad Tracks, The (feature on Moon), 7:36, 39
rainbows
 Alexander’s Dark Band, 11:26
 colorblindness and, 11:27
 conditions needed to see, 11:26
 cone of vision and, 11:26–27
 early research and discoveries regarding, 11:25–26
 nocturnal, 11:27
 secondary, 11:26
 tertiary, 11:26
Ran. *See* Epsilon Eridani
Raspberry Nebula (LBN 867), image of, 2:58
red dwarfs. *See names of specific red dwarfs*
Red Spider Nebula (NGC 6537)
 image of, 1:40
 observing, 1:40
 overview of, 1:40
reflection nebulae, observing, 10:22. *See also names of specific reflection nebulae*
Regulus Dwarf. *See* Leo I
Rho Ophiuchi Complex (star forming region)
 image of, 1:41
 image of over Bryce Canyon, 12:55
 image of over northern India, 9:55
 observing, 1:41
 overview of, 1:41
Ring Nebula (M57), observing central star of, 8:46
ring system, of Saturn
 ansae, 11:48
 Mach band, 11:48
 remaining lifetime of, 10:52–53
 sequential images of ring plane, 12:55
Ringtail Galaxies. *See* Antennae Galaxies
Robin’s Egg Nebula (NGC 1360), image of, 11:56
rockets, amateur rocketry, 11:44–47. *See also names of specific rockets*
rogue planets, 12:7
Rose, The (Arp 273) (galaxy pair), image of, 3:56
Rosetta spacecraft, 6:20
Rosette Nebula (Caldwell 49; NGC 2237/38/39)
 images of, 2:43, 5:40
 observing, 2:43
 wide-field imaging of, 6:40

Astronomy Magazine Article Subject Index 2024

rovers, *see also names of specific rovers*
 cancellation of VIPER mission, 12:8–9
 lack of dust-removal systems for solar panels, 2:54–55
RR Lyrae (variable star)
 discoveries regarding, 1:54
 image of, 1:54
 overview of, 1:54
RS Puppis (variable star), 7:52
Rubio, Frank, 2:7
Running Chicken Nebula (IC 2944), images of, 5:58, 9:54

S

S₈ tension, FLAMINGO project simulation, 2:9
Safe Solar Viewer (SSV), 2:46–47
Sag DEG (Sagittarius Dwarf Elliptical Galaxy), 8:24–25, 27
SagDIG. *See* Sagittarius Dwarf Irregular Galaxy
Sagittarius A* (Sgr A*) (black hole)
 ancient star orbiting, 5:9
 magnetic field, 7:8–9
 possible hidden jet, 7:8
Sagittarius C (Sgr C) (star-forming region), 3:7
Sagittarius Dwarf Elliptical Galaxy (Sag DEG), 8:24–25, 27
Sagittarius Dwarf Irregular Galaxy (ESO 594–4; SagDIG; Sgr dIG)
 discovery of, 1:40
 image of, 1:40
 observing, 1:40
 overview of, 1:40
SAO 112667 (star), 2:58
satellites
 See also names of specific satellites
 fine for failure to move dead satellite to safe orbit, 3:12
 North and South Korean spy satellites, 3:9
 tracks of across night sky, 7:19, 21
Saturn
 See also names of moons orbiting
 optical phenomena associated with rings of, 11:48
 remaining lifetime of ring system, 10:52–53
 sequential images of ring plane, 12:55
Saturn Nebula (NGC 7009)
 discovery of, 1:38
 image of, 1:38
 observing, 1:38
 overview of, 1:38
Sculptor (constellation), observations within, 10:24–27
Sculptor Dwarf Galaxy
 discovery of, 1:37, 42
 images of, 1:42, 10:27
 observing, 1:42, 10:27
 overview of, 1:42
Sculptor Galaxy (Silver Coin Galaxy; Silver Dollar Galaxy; Caldwell 65; NGC 253), 10:25–26
SDSO-1 (Strottnner-Drechsler-Sainty Object 1) (emission nebula)
 discovery of, 1:58
 image of, 1:58
 overview of, 1:58
SDSS1335+0728 (galaxy), 11:10
Serpens Nebula, alignment of protostars within, 11:36–37
Serpens-Aquila rift, observing, 2:44
Seven Sisters star cluster. *See* Pleiades star cluster

Astronomy Magazine Article Subject Index 2024

- Seyfert galaxies, discovery of, 1:8. *See also names of specific Seyfert galaxies*
- Seyfert's Sextet (galaxy group)
 - discovery of, 1:16
 - image of, 1:16
 - overview of, 1:16
- Sgr A*. *See* Sagittarius A*
- Sgr C (Sagittarius C) (star-forming region), 3:7
- Sgr dIG. *See* Sagittarius Dwarf Irregular Galaxy
- shadow transits
 - defined, 12:48
 - moons of Jupiter, 12:48
- Sharpless 2–9 (emission nebula), 1:41
- Sharpless 2–54 (nebula)
 - image of, 2:44
 - observing, 2:44–45
- Sharpless 2–71 (planetary nebula), image of, 2:57
- Sharpless 2–80. *See* M1–67
- Sharpless 2–83 (emission nebula), image of, 11:55
- Sharpless 2–115 (emission nebula), image of, 10:54–55
- Sharpless 2–116 (emission nebula), image of, 10:54–55
- Sharpless 2–155 (Cave Nebula), image of, 9:56–57
- Sharpless 2–170 and NGC 7762 (Question Mark Nebula), image of, 5:45
- Sharpless 2–223 (hydrogen cloud), image of, 5:56
- Sharpless 2–224 (supernova remnant), image of, 5:56
- Sharpless 2–225 (hydrogen cloud), image of, 5:56
- Sharpless 2–240. *See* Spaghetti Nebula
- Sharpless 2–248. *See* Jellyfish Nebula
- Sharpless 2–263 (emission nebula), 2:58
- Sharpless 2–274. *See* Medusa Nebula
- Sharpless 2–276. *See* Barnard's Loop
- Silver Coin Galaxy (Sculptor Galaxy; Silver Dollar Galaxy; Caldwell 65; NGC 253), 10:25–26
- Simeis 147. *See* Spaghetti Nebula
- Sirius A (star), image of, 5:50
- Sirius B (star), image of, 5:50
- 16 Psyche. *See* Psyche
- Skull and Crossbones Nebula (NGC 2467), image of, 3:55
- sky atlases, death of cartographer Wil Tirion, 10:7
- SLIM (Smart Lander for Investigating Moon) mission, landing of, 5:7
- Slipher, Vesto, 12:14–23
- SMBHs. *See* black holes
- SMILE (Solar wind Magnetosphere Ionosphere Link Explorer), 2:25
- SN 1987A (supernova), verification of neutron star within core of, 6:11
- Snake Nebula (Barnard 72)
 - image of, 1:44
 - observing, 1:44
 - overview of, 1:44
- SOFIA (Stratospheric Observatory for Infrared Astronomy), water on asteroids, 6:7
- solar eclipses
 - 2023 (October), 2:16–17, 57, 3:36–41
 - 2024 (April), 2:21, 4:8–13, 14–19, 20–25, 26–27, 36–49, 50–54, 7:54–57, 9:15–23
 - 2026 (August), 4:56
 - 2027 (August), 4:56–57
 - 2028 (July), 4:57
 - 2030 (November), 4:57–58
 - 2034 (March), 4:58
 - 2035 (September), 4:58
 - 2037 (July), 4:58
 - 2041 (April), 4:58

Astronomy Magazine Article Subject Index 2024

- 2042 (April), 4:58
- 2044 (August), 4:13
- 2045 (August), 4:58
- annular versus total, 2:16
- Baily's beads, 4:18
- bird and animal behavior during, 4:17, 9:23, 47
- effects of El Niño on viewing, 4:23–24
- light-related phenomena during, 4:16–18, 9:17
- next 20 years of, 4:56–58
- observing planets and stars during, 4:19
- photography during, 4:50–54
- pinhole projection, 2:52
- projected crescents, 4:16
- Safe Solar Viewer (SSV), 2:46–47
- safely viewing, 2:52, 4:15–16
- shadow bands, 4:17
- solar filters, 2:52
- solar glasses, 2:52
- step-by-step viewing guide, 4:14–19
- sun projectors, 4:26–27
- telescopic solar projection, 2:52
- temperature changes during, 4:16, 24
- total versus partial, 4:10
- traffic problems around, 4:11–12
- viewing totality, 4:13, 18
- weather issues, 4:10–12, 20–25
- solar flares
 - anatomy of, 3:20–21
 - ancient Miyake events, 3:20, 22
 - Carrington Event, 3:20
 - danger to Earth, 3:20–22
 - discovery of, 11:18
 - magnetic reconnection, 11:18–19
 - nanoflares and temperature of corona, 11:20, 22
 - outside our solar system, 3:21–22
 - predicting, 3:21
 - superflares, 3:20–22
- solar prominences, image of, 10:56–57
- solar system
 - See also names of specific features within*
 - age of planets in, 5:53
 - changes to habitable zone, 3:25
 - effect of dark matter on, 12:50–51
 - interstellar interlopers, 6:12–21
 - molecular cloud possibly passed through by, 11:9
 - order of planet formation in, 5:53
- Solar wind Magnetosphere Ionosphere Link Explorer (SMILE), 2:25
- solar winds, 11:22–23
- Sombrero Galaxy (M104)
 - image of, 10:21
 - Slipher's observations of redshift, 12:18–19
- Southern Cigar Galaxy (NGC 55)
 - distance from Earth, 8:40
 - image of, 10:26
 - observing, 8:39, 10:25–26
- Southern Pinwheel Galaxy (Caldwell 70; M83; NGC 300)
 - distance from Earth, 8:40
 - image of, 1:44, 10:24

Astronomy Magazine Article Subject Index 2024

- observing, 1:44, 8:39, 10:26–27
- overview of, 1:44
- Southern Pleiades (IC 2602) (open star cluster)
 - image of, 1:55
 - overview of, 1:55
- Southwest Research Institute (SwRI), 5:36–39
- space junk
 - astronauts shelter in return vehicles due to danger from, 11:7
 - breakup of Russian satellite, 11:7
 - crashing through roof of house, 7:9
- spacecraft
 - See also names of specific spacecraft*
 - collision avoidance when passing through asteroid belt, 12:52–53
 - lack of dust-removal systems for solar panels on landers/rovers, 2:54–55
 - overview of China’s recent and future missions, 2:22–27
- SpaceX, contract for vehicle to remove ISS from orbit, 10:9. *See also names of specific spacecraft and missions*
- Spaghetti Nebula (Sh 2–240; Simeis 147) (supernova remnant)
 - discovery of, 1:21
 - image of, 1:21
 - observing, 1:21, 2:43
 - overview of, 1:21
- Spare Tire Nebula (IC 5148), image of, 6:57
- spectroscopes
 - discoveries resulting from development of, 11:18
 - function of, 12:18
 - Vesto Slipher and cosmic expansion, 12:16–17
- Spider, The (feature on Moon), 7:36–37
- spiral galaxies. *See names of specific spiral galaxies*
- Spiral Planetary Nebula (NGC 5189)
 - ansae, 1:57
 - image of, 1:57
 - observing, 1:57
 - overview of, 1:57
- Spirograph Nebula (IC 418)
 - image of, 1:43
 - overview of, 1:43
- Spitzer Space Telescope, tidally-locked exoplanet, 7:7
- Sputnik Planitia (feature on Pluto), theory on formation of, 8:5
- SS 433 (microquasar)
 - image of, 1:45
 - observing, 1:45
 - overview of, 1:45
- SSV (Safe Solar Viewer), 2:46–47
- Stafford, Tom, 7:7
- star clusters. *See also names of specific star clusters*
- Starizona Nexus 0.75x Newtonian Focal Reducer/Coma Corrector, 10:46–49
- Starmus Festival, 11:39–43
- stars
 - See also names of specific stars; names of specific types of stars*
 - consuming planets, 7:9
 - death rate of, in Milky Way, 5:50–51
 - fastest proper motion known, 1:26
 - formation of, 6:36–37
 - green, 3:50
 - images of trails, 6:55–56
 - smallest known galactic runaway, 12:9
 - unusual composition with heavy elements, 5:9
- Starship lander, first successful reentry and controlled landing test, 9:12–13

Astronomy Magazine Article Subject Index 2024

- Stellarvue SVX180T refractor telescope, 3:44–47
- Stephan’s Quintet (NGC 7317/18A/18B/19/20) (galaxy group)
 - discovery of, 1:13
 - distance from Earth, 8:40–41
 - image of, 1:13
 - observing, 8:40–41
 - overview of, 1:13
- Steppingstones, The (feature on Moon), 7:36–37
- STEVE (Strong Thermal Emission Velocity Enhancement) phenomena, image of, 2:57
- Straight Wall (feature on Moon), 7:36, 38
- Stratospheric Observatory for Infrared Astronomy (SOFIA), water on asteroids, 6:7
- Streicher 7 (asterism)
 - image of, 1:54
 - observing, 1:54
 - overview of, 1:54
- Strong Thermal Emission Velocity Enhancement (STEVE) phenomena, image of, 2:57
- Strottnner-Drechsler-Sainty Object 1. *See* SDSSO-1
- Struve’s Lost Nebula (NGC 1554), 1:20
- sulfur, discovery of pure crystals on Mars, 11:7
- Sun
 - See also* solar eclipses; solar flares; solar prominences; sunspots
 - anatomy of, 11:20–21
 - carbon-nitrogen-oxygen cycle, 11:16
 - changes to habitable zone, 3:25
 - core of, 11:14–16
 - coronae of, 11:19–20, 22
 - coronal holes, 11:22
 - coronal mass ejections, 3:20–22, 8:55–57, 11:21–22
 - death of, 3:25
 - early discoveries regarding, 11:14
 - eclipses of, 2:16–17, 21, 46–47, 52, 57, 3:36–41, 4:8–27, 36–54, 56–58, 7:54–57, 9:15–23, 47
 - fusion in, 11:14, 17
 - hydrogen-alpha observations of, 5:48
 - image of chromosphere, 11:57
 - images of prominences and filaments, 6:55, 10:56–57
 - magnetic field produced at shallow depth, 9:9
 - magnetic reconnection, 11:18–19
 - meridional circulation, 11:18, 21
 - neutrinos, 11:16–17
 - Novaya Zemlya effect, 3:14
 - observing basics, 5:48
 - overview of, 11:14–23
 - picojets, 11:23
 - solar cycle 25, 10:56–57
 - solar winds, 11:22–23
 - spectroscopes, 11:18
 - surface of, 11:16–18
- sunspots
 - AR 3664, 8:54–55
 - AR 13055, 2:55
 - causes of, 2:55
 - cyclic behavior of, 11:17–18, 23
 - early discoveries regarding, 11:14, 17
 - origin of, 11:17
- Suomi National Polar-orbiting Partnership satellite, 9:11
- superclusters. *See names of specific superclusters*
- supermassive black holes. *See* black holes
- supernovae

Astronomy Magazine Article Subject Index 2024

See also names of specific supernovae

danger to Earth, 3:22–24

detecting effects of ancient, 3:23–24

observing deep-sky objects, 10:21–22

Swan Nebula (Checkmark Nebula; Horseshoe Nebula; Omega Nebula; M17)

images of, 2:44, 11:55

observing, 2:44–45

SwRI (Southwest Research Institute), 5:36–39

T

T Tauri (variable star)

discovery of, 1:53

image of, 1:53

overview of, 1:53

Tabby's Star

image of, 1:57

overview of, 1:57

Tadpole, The (feature on Moon), 7:36, 38

Tadpole Galaxy (UGC 10214)

image of, 1:48

observing, 1:48

overview of, 1:48

Taffy Galaxies (UGC 12914/15)

image of, 1:8–9

overview of, 1:8

Tarantula Nebula (NGC 2070), image of, 5:43

Tasmanian Devil (AT2022tsd) (LFBOT object), 3:10

Taurus (constellation), observations within, 12:43–47

TDEs (tidal disruption events), longest observed, 11:10

Tejat (star), image of, 10:22

telescopes

See also observatories; names of specific telescopes and observatories

coma correctors, 10:46–49

diameter, and brightness versus size of objects, 6:51

expected visible color through 10-inch telescopes, 10:53

field of view, 8:48

focal length, 8:48

NSF's recommended funding cap for extremely large telescopes, 6:9

viewing Pluto with backyard telescopes, 12:51–52

temperature

changes to during solar eclipses, 4:16, 4:24

nanoflares and temperature of Sun's corona, 11:20, 22

theoretical maximum, 7:51

TESS (Transiting Exoplanet Survey Satellite), Kepler space telescope versus, 8:51–52

TGO (ExoMars Trace Gas Orbiter), spider-like features on Mars caused by geysers, 8:9

Theia (theoretical planet), 8:14

Thirty Meter Telescope, 6:9

Thisbe's Veil. *See* Coma Star Cluster

Thor's Hammer (feature on Moon), 7:36, 39

Thor's Helmet (NGC 2359) (emission nebula)

image of, 1:44–45

observing, 1:45

overview of, 1:45

3C 273 (quasar)

image of, 1:18

observing, 1:18

overview of, 1:18

Tiangong space station, 2:22–23

Astronomy Magazine Article Subject Index 2024

Tianlong-3 rocket, breaking free from test platform, 10:9
Tianwen 1 mission, 2:24, 26
Tianwen 2 mission, 2:26
Tianwen 3 mission, 2:25–26
Tianwen 4 mission, 2:26
TIC 365102760 b (Phoenix) (exoplanet), 10:7
TIC 393818343 b (exoplanet), 10:9
tidal disruption events (TDEs), longest observed, 11:10
Tirion, Wil, 10:7
Titan (moon of Saturn), tidal activity on, 11:11
Transiting Exoplanet Survey Satellite (TESS), Kepler space telescope versus, 8:51–52
transits
 defined, 12:48
 moons of Jupiter, 12:48
Triangulum Galaxy (M33; Pinwheel galaxy), hydrogen-alpha image of, 12:56–57
Trifid Nebula (M20), images of, 5:44–45, 10:18–19
22 Scorpii (star), image of, 10:57
Twin Quasar (Q0957+561)
 discovery of, 1:10
 image of, 1:10
 overview of, 1:10

U

UAPs (unidentified anomalous phenomena), NASA team assigned to help government understand, 2:9
UFOs (unidentified flying objects). *See* UAPs
UGC 3697. *See* Integral Sign Galaxy
UGC 3714 (galaxy), 1:13
UGC 5470. *See* Leo I
UGC 10214. *See* Tadpole Galaxy
UGC 12914/15 (Taffy Galaxies). *See* Taffy Galaxies
UMa3/U1 (galaxy), 8:7
unidentified anomalous phenomena (UAPs), NASA team assigned to help government understand, 2:9
unidentified flying objects (UFOs). *See* UAPs
Unistellar eQuinox 2, 5:46–47
universe
 age of, 8:17
 Big Crunch, 3:25
 daytime study of, 2:54
 expansion of, 6:9, 52, 11:51–52
 size of, 8:17
 size of compared to age, 6:52
 ten modern mysteries of, 8:12–21
 theories regarding end of, 8:20
Uranus, new moon discovered, 6:9. *See also names of moons orbiting*
Ursa Major Moving Group
 image of, 1:56
 overview of, 1:56
Ursa Minor (constellation), binocular observations within, 2:53

V

V838 Monocerotis (star), light echoes, 8:50–51
Valentine Dome (feature on Moon), 7:36, 38
Vaonis Vespera telescope, 2:48–49
variable stars, observing, 10:17–18. *See also names of specific variable stars*
vdB 38 (reflection nebula), 2:58
Veil Complex, wide-field imaging of, 7:44
Vela Supernova Remnant (Gum 16)
 close-up image of shock wave, 6:7

Astronomy Magazine Article Subject Index 2024

- discoveries regarding, 1:48
- image of, 1:48
- observing, 1:48
- overview of, 1:48
- Venus
 - cataclysmic global resurfacing of, 8:15
 - conjunction of with Beehive cluster, 12:12
 - evidence of lava flows detected by Magellan, 9:10
 - image of with Moon, 3:55
 - possible volcanic eruption detected by Magellan, 2:14–15
- Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy (VERITAS) mission, plans for, 9:10
- Venus Volcano Imaging and Climate Explorer (VOICE), 2:25
- Vera C. Rubin Observatory (VRO)
 - image of, 6:16–17
 - LSST camera, 6:17, 8:10, 11:9
 - secondary mirror installed, 11:9
- VERITAS (Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy) mission, plans for, 9:10
- Very Large Telescope (VLT), PHANGS collaboration, 6:36
- Victor M. Blanco 4-meter Telescope, Vela supernova remnant, 6:7
- VIII ZW 388. *See* Zwicky's Necklace
- VIPER (Volatiles Investigating Polar Exploration Rover), cancelation of mission, 12:8–9
- Virgin Galactic, ancient hominin fossils on commercial flight, 2:9
- Virgo Cluster
 - image of, 2:44
 - observing, 2:44
- VLT (Very Large Telescope), PHANGS collaboration, 6:36
- VOICE (Venus Volcano Imaging and Climate Explorer), 2:25
- Volatiles Investigating Polar Exploration Rover (VIPER), cancelation of mission, 12:8–9
- volcanism
 - on Earth, image of Milky Way over volcano, 3:54
 - on Io, long history of, 8:8
 - on Moon, evidence lunar surface was once covered in magma, 12:7
 - on Moon, fountain model of lunar crater origin, 12:38–42
 - on Venus, cataclysmic global resurfacing, 8:15
 - on Venus, evidence of recent activity, 2:14–15, 9:10
- Voyager 1 space probe, reestablished link after five-months of gibberish signals, 8:7
- VRO. *See* Vera C. Rubin Observatory
- VY Canis Majoris (star), history of observations, 2:50
- VY CMa nebula, history of observations, 2:50
- W
- WASP-43b (exoplanet), 8:5
- WASP-107 b (exoplanet), sand falling as rain, 3:9
- water
 - on asteroids, 6:7
 - in disk around HL Tauri, 6:7
 - on Mars, disappearance of, 8:15
 - on Mars, ice deposits, 10:7
 - on Mars, possible buried glacier, 8:7
 - on Mars, subsurface water, 12:11
 - on Mimas, subsurface ocean, 6:7
 - on parent body of Bennu, 10:10
- Whirlpool Galaxy (M51)
 - distance from Earth, 8:40
 - observing, 8:39
- white dwarfs. *See also names of specific white dwarfs*
- Wild's Triplet (Arp 248) (galaxy group)
 - discovery of, 1:24

Astronomy Magazine Article Subject Index 2024

- images of, 1:24, 3:58
- observing, 1:24
- overview of, 1:24
- WLM. *See* Wolf-Lundmark-Melotte
- Wolf 359 (red dwarf)
 - flares, 1:52
 - image of, 1:52
 - overview of, 1:52
- Wolf-Lundmark-Melotte (WLM) (barred irregular galaxy)
 - discovery of, 1:22
 - image of, 1:22
 - observing, 1:22
 - overview of, 1:22
- Wolf-Rayet (WR) stars, possible magnetar progenitor, 2:15. *See also names of specific Wolf-Rayet stars*
- WR 124. *See* Merrill's Star
- WR 134 (Wolf-Rayet star), image of, 12:56–57
- WR 136 (HD 192163) (Wolf-Rayet star), 1:15
- Wukong (Dark Matter Particle Explorer [DAMPE]), 2:25

X

- X-ray astronomy
 - Cloverleaf odd radio circle, 10:8–9
 - most distant supermassive black hole seen via, 2:9
 - X-ray binaries, 5:19
- XTE J1810–197 (magnetar), 8:5
- Xuntian space telescope, 2:24, 27

Y

- YGKOW G1 (galaxy), 1:10
- Yutu rover, 2:22

Z

- Zeta Ursae Majoris. *See* Mizar
- Zhurong rover, 2:24, 26
- zodiacal light
 - defined, 7:13
 - image of, 2:44–45
 - observing, 2:44
- ZS7 (galaxy pair), 10:44–45
- ZTF (Comet C/2022 E3), 2:16
- Zwicky's Necklace (VIII ZW 388) (galaxy group)
 - discovery of, 1:25
 - image of, 1:25
 - overview of, 1:25
- Zwicky's Triplet (Arp 103) (triple galaxy system)
 - image of, 1:12
 - overview of, 1:12

Astronomy Magazine Article Title Index 2024

TITLE

A

Abell 194, 1:50
Alpha Persei Cluster, 1:8
Amateurs nab deep-sky nebulous nymphs, 11:12
Ant Nebula, 1:38–39
Antennae Galaxies, 1:37
Appraising the Origin Home Observatory, 12:24–27
Astronomers find six planets orbiting in resonance, 3:8–9
Astronomers measure a supermassive black hole’s spin, 9:8–9
Astronomy’s atlas of totality, 4:36–49
Astrophotography and the art of collaboration, 5:40–45
Atoms for Peace Galaxy, 1:54–55

B

Barnard’s E, 1:23
Barnard’s Galaxy, 1:39
Barnard’s Loop, 1:36
Barnard’s Star, 1:26
Bennu’s watery past, 10:10
Biggest astronomical camera complete, 8:10
Billowing volcanic plumes, 9:11
Black hole bugaloo, 10:44–45
Black holes don’t suck!, 5:24
A blast from the past, 12:36–37
The Boomerang Nebula, 1:52
Bringing the Sun to light, 11:14–23
Build a better sun projector, 4:26–27
Build a mental model of the cosmos, 8:38–41
Building a dark-sky coalition, 7:22
The Bullet Cluster, 1:49
Burbidge’s Chain, 1:43
A burst from a ‘blob,’ 5:12

C

Can we catch an interstellar interloper?, 6:12–21
Cartwheel Galaxy, 1:45
Celestial fun, 2:10
A celestial transference phenomenon, 12:12
Celestron’s SkyMaster binoculars reviewed, 7:46–47
Chang’e 6 nabs first samples from Moon’s farside, 10:10–11
Chasing nightscapes, 6:38–43
Chilly summits on mars, 10:7
China’s deep-space ambitions, 2:22–27
The Cloverleaf, 1:50
Coalsack Nebula, 1:53
The Coma Galaxy Cluster, 1:52
The Coma Star Cluster, 1:25
Copeland’s Septet, 1:24
Cosmic cotton candy, 3:12
Cosmic sea creatures, 9:7
Cosmological simulation milestone, 2:8–9
Crescent Nebula, 1:15

D

Astronomy Magazine Article Title Index 2024

Dark Doodad, 1:40
A distant black hole awakens, 11:10
Drama in the heavens, 9:20
Dwarf galaxies' black holes behave differently, 11:10
DwarfLab's lightweight smart scope, 8:44–45
Dwingeloo 1, 1:10

E

Eclipse perfecto, 9:17
Eclipse traffic, 4:12
Eclipse viewing made simple, 2:46–47
An eclipse with heritage, 9:18
Egg Nebula, 1:16
Einstein Cross, 1:51
Einstein's role, 12:16–17
Epsilon Eridani, 1:19
Eta Carinae, 1:51
Euclid's first vistas, 2:7
Examining Galileo's TOES, 12:48
Explore the sky with Celestron's autoguider, 6:44–45
Exploring a cluster conundrum, 9:36–37
Exploring Turkey's dark-sky delights, 2:36–41

F

Feather-weight champion, 5:7
Fighting the light, 7:14–23
Fornax Dwarf, 1:37
Framing the shot, 8:48
Free-floating binary 'planets' baffle theorists, 3:26–27
FU Orionis, 1:56

G

Galactic center, 1:47
The galactic dead remain, 6:11
Galactic megamergers could explain enormous radio circles, 10:8–9
A galaxy not yet born, 5:12
Gaze into the eye of the Bull, 12:43–47
The Gegenschein puzzle, 7:13
Gomez's Hamburger, 1:42
The Great American Eclipse delivers, 9:14–23
The Great American Eclipse delivers—Dallas, Texas, 9:16–17
The Great American Eclipse delivers—Ingram, Texas, 9:20–21
The Great American Eclipse delivers—Torreón, Mexico, 9:18–19
Growing globular gems, 10:9
Gum Nebula, 1:46
Gyulbudaghian's Nebula, 1:14

H

The Hercules Galaxy Cluster, 1:21
A hero's buried treasure, 5:26–27
Hind's Variable Nebula, 1:20
Hoag's Object, 1:11
A hot-headed stallion, 8:5
How centaurs sprout their tails, 7:10
How DART reshaped Dimorphos, 6:10
How Rubin will change our view, 6:17
How spectroscopy works, 12:18

Astronomy Magazine Article Title Index 2024

How to read rainbows, 11:25–27
How to view the eclipse, step by step, 4:14–19
Hubble sees hydrogen, 12:9

I

IC 443, 1:27
Icy worlds' secrets, 3:10
Image like Hubble, 6:48
Ingenuity's flight log, 5:10–11
Inside America's unsung space center, 5:36–39
Inside the world of deep-sky objects, 10:14–23
The Integral Sign Galaxy, 1:13
The Intergalactic Wanderer, 1:12
Interstellar debris claim debated, 7:11
Io's long, active life, 8:8

J

Jewel Box Cluster, 1:50
Jones 1, 1:10
Jones-Emberson 1, 1:9
The joys of wide-field imaging, 7:40–45
JWST catches supersonic jet, 2:9
JWST hunts for rogue worlds, 12:7
JWST images a Penguin and Egg, 11:7
JWST peers inside SN 1987A, 6:11
JWST sees strange black holes in the early universe, 5:8–9
JWST spies thick air around rocky world, 9:12–13

K

Kapteyn's Star, 1:48
Keenan's System, 1:17
Kepler's Supernova, 1:46

L

Lalande 21185, 1:20
Lemon Slice Nebula, 1:38
Lending an ear to the eclipse, 9:23
Leo I, 1:26
Lighting up the Cigar, 7:10
A looney star, 3:11
Lunar lava tube could shelter a future Moon base, 11:8–9

M

M15 and Pease 1, 1:20
M67, 1:36
M87, 1:56
Maffei 1 and Maffei 2, 1:14
A magnetic mystery solved, 7:12
A magnificent event, 3:38
The man behind the comet, 6:22–27
Mars may host oceans' worth of buried water, 12:11
Mars rock could have signs of life, 11:11
A matter of perspective, 6:10
Mayall's Object, 1:15
Measuring magnitudes, 8:42–43
The Medusa Nebula, 1:26

Astronomy Magazine Article Title Index 2024

Mergers and acquisition, 8:25
Merrill's Star Nebula, 1:25
Mice Galaxies, 1:55
The Milky Way's central black hole could have a hidden jet, 7:8–9
Model rocketry takes off in Oregon, 11:44–47
The Moon as it never was, 12:38–42
Morehouse's black ring, 10:12

N

NASA cancels fully built Moon rover, stunning scientists, 12:8–9
NASA reboots Mars sample return, 8:10
NASA's Lucy discovers surprise asteroid on 'Dinky' flyby, 2:8
NASA's slithering rover, 8:8–9
Nature's eclipse reactions, 9:47
The Necklace Nebula, 1:23
Neptune's true hues, 6:9
The next 20 years of eclipses, 4:56–58
NGC 147 and NGC 185, 1:11
NGC 300, 1:44
NGC 404, 1:22
NGC 520, 1:18
NGC 1023, 1:9
NGC 1275 et al., 1:15
NGC 3079 and Q0957+561, 1:10
NGC 3190 Galaxy Group, 1:19
NGC 4151, 1:8
NGC 4319 and Markarian 205, 1:16
NGC 4485 and the Cocoon Galaxy, 1:12
NGC 5189, 1:57
NGC 6231, 1:39
NGC 6826, 1:17
Northward bound, 2:52

O

Odysseus makes epic lunar journey, breaks leg, phones home, 6:8–9
101 weirdest cosmic objects, 1:7–27, 36–58
Our 14th annual Star Products, 10:36–43

P

P Cygni, 1:49
Pencil Nebula, 1:37
A personal Perseids story (The same sky), 3:42–43
PG 1634+706, 1:41
Picture perfect, 3:40
A planet too big for its star, 3:10
Process JWST images like a pro, 9:38–41
Purgathofer-Weinberger 1, 1:18

R

A rainbow of stars, 9:48
Red Spider Nebula, 1:40
Renaming the Hubble constant, 12:14–23
Responsible lighting, 7:17
Reviewing the amazing Stellarvue 180mm refractor, 3:44–47
Rho Ophiuchi Region, 1:41
The Ring Nebula's twilight zone, 8:46
'Ring of fire' blazes across the Americas, 3:36–41

Astronomy Magazine Article Title Index 2024

The rise of astronomical almanacs, 7:24–25
Robert Reeves' Postcards from the Moon, 7:36–39
RR Lyrae, 1:54

S

Safe solar observing, 2:51
SagDIG, 1:40
Saturn Nebula, 1:38
A Saturn ring image, 11:48
Scientists identify dinosaur-killer asteroid, 12:10
Sculptor Dwarf, 1:42
Searching for the closest black holes, 5:16–25
Secrets of successful autoguiding, 9:43–46
See these super-sized celestial gems, 2:42–45
Seyfert's Sextet, 1:16
Simeis 147, 1:21
Snake Nebula, 1:44
Southern Pleiades, 1:55
'Spiders' on Mars, 8:9
The spiral galaxy next door, 9:24–27
Spirograph Nebula, 1:43
SS 433, 1:45
Star formation in a new light, 6:36–37
Staring at the Sun, 5:48
Starmus spotlights Planet Earth, 11:38–43
Stars of the show, 7:7
Starship passes reentry test for first time, 9:12–13
A stellar colossus, 2:50
Stephan's Quintet, 1:13
A storm you want to stay inside for, 9:11
Streicher 7, 1:54
Strodtner-Drechsler-Sainty Object 1, 1:58
The Sun under a spectroscope, 11:18
The Sun's many crowns, 11:22
Survivors from the Milky Way's birth, 8:22–27

T

T Tauri, 1:53
Tabby's Star, 1:57
Tadpole Galaxy, 1:48
Telescopes unite, 3:12
10 modern mysteries of the universe, 8:12–21
These are the ways our world will end, 3:16–25
Thor's Helmet, 1:44–45
3C 273, 1:18
Tiny galaxies pack a huge wallop, 7:26–27
Titan's seas have tiny waves, tidal currents, 11:11
Top 10 space stories of 2023, 2:12–21
Tour the Sculptor's workshop, 10:24–27
Tropical Novaya Zemlya effects, 3:14
Trouble at the heart of cosmology, 8:36–37
25 tips for the best eclipse photos, 4:50–54
Two black holes found dancing in the night, 8:6–7

U

UGC 12914 and UGC 12915, 1:8
Ultimate guide to the eclipse, 4:8–13

Astronomy Magazine Article Title Index 2024

Under dark skies, 7:48
Undset's forgotten mountain, 5:14
Unistellar's new smart scope reviewed, 5:46–47
Unparalleled look at galactic core, 3:7
Ursa Major Moving Group, 1:56

V

Vaonis' new smart scope, 2:48–49
The vast universe, 8:17
The Vela Supernova Remnant, 1:48
Venusian volcanism spotted again, 9:10
Vera C. Rubin Observatory's secondary mirror now in place, 11:9

W

We test: Starizona's Nexus coma corrector, 10:46–49
Weighing a middling-mass black hole, 12:10
Welcome to Firecrown Media, 10:5
What interstellar objects can teach us, 6:15
What Messier missed, 3:48
What time is it on the Moon?, 8:11
Where the (proto)stars align, 11:36–37
Wild's Triplet, 1:24
Wind in the sails, 6:7
WLM, 1:22
Wolf 359, 1:52
A word on wide fields, 7:43

Y

Your eclipse weather forecast, 4:20–25
Your first astroimaging rig, 10:50

Z

Zwicky's Necklace, 1:25
Zwicky's Triplet, 1:12

AUTHOR

A

Aerts, Leo

The Moon as it never was, 12:38–42

Anderson, Jay

Your eclipse weather forecast, 4:20–25

B

Bakich, Michael E.

Barnard's E, 1:23

Barnard's Loop, 1:36

Build a better sun projector, 4:26–27

Build a mental model of the cosmos, 8:38–41

Celestron's SkyMaster binoculars reviewed, 7:46–47

The Coma Star Cluster, 1:25

Copeland's Septet, 1:24

Drama in the heavens, 9:20

Gaze into the eye of the Bull, 12:43–47

The Hercules Galaxy Cluster, 1:21

Hind's Variable Nebula, 1:20

IC 443, 1:27

JWST hunts for rogue worlds, 12:7

Lalande 21185, 1:20

Leo I, 1:26

M15 and Pease 1, 1:20

M67, 1:36

A magnificent event, 3:38

Mars rock could have signs of life, 11:11

Measuring magnitudes, 8:42–43

The Medusa Nebula, 1:26

Merrill's Star Nebula, 1:25

The Necklace Nebula, 1:23

The next 20 years of eclipses, 4:56–58

NGC 404, 1:22

NGC 520, 1:18

NGC 3190 Galaxy Group, 1:19

101 weirdest cosmic objects, 1:18–27, 36

Purgathofer-Weinberger 1, 1:18

Scientists identify dinosaur-killer asteroid, 12:10

Simeis 147, 1:21

3C 273, 1:18

Tour the Sculptor's workshop, 10:24–27

25 tips for the best eclipse photos, 4:50–54

Wild's Triplet, 1:24

WLM, 1:22

Zwicky's Necklace, 1:25

Bartusiak, Marcia

Renaming the Hubble constant, 12:14–23

Berman, Bob

Celestial fun, 2:10

Bradley, Adrian

Chasing nightscapes, 6:38–43

Brasch, Klaus

The Moon as it never was, 12:38–42

The spiral galaxy next door, 9:24–27

Astronomy Magazine Article Author Index 2024

C

Cendes, Yvette

- Black holes don't suck!, 5:24
- Searching for the closest black holes, 5:16–25

Chandler, David L.

- Can we catch an interstellar interloper?, 6:12–21

Cokinos, Christopher

- Building a dark-sky coalition, 7:22
- Fighting the light, 7:14–23
- Responsible lighting, 7:17

D

Dibbell, Frank

- Explore the sky with Celestron's autoguider, 6:44–45
- The joys of wide-field imaging, 7:40–45
- A word on wide fields, 7:43

E

Eicher, David J.

- The Great American Eclipse delivers—Dallas, Texas, 9:16–17
- Inside the world of deep-sky objects, 10:14–23
- 101 weirdest cosmic objects, 1:7
- Starmus spotlights Planet Earth, 11:38–43
- 10 modern mysteries of the universe, 8:12–21
- The vast universe, 8:17

Evans, Ben

- Mars may host oceans' worth of buried water, 12:11

F

Falk, Dan

- The man behind the comet, 6:22–27

Fuller, Craig

- Welcome to Firecrown Media, 10:5

G

Gamillo, Elizabeth

- Cosmic cotton candy, 3:12
- The galactic dead remain, 6:11
- Interstellar debris claim debated, 7:11
- JWST catches supersonic jet, 2:9
- JWST sees strange black holes in the early universe, 5:8–9
- Lending an ear to the eclipse, 9:23
- A matter of perspective, 6:10
- 'Spiders' on Mars, 8:9
- Vera C. Rubin Observatory's secondary mirror now in place, 11:9
- Wind in the sails, 6:7

Goldstein, Alan

- Ant Nebula, 1:38–39
- Antennae Galaxies, 1:37
- Barnard's Galaxy, 1:39
- Burbidge's Chain, 1:43
- Cartwheel Galaxy, 1:45
- Dark Doodad, 1:40
- Fornax Dwarf, 1:37
- Galactic center, 1:47
- Gomez's Hamburger, 1:42

Astronomy Magazine Article Author Index 2024

Gum Nebula, 1:46
Kepler's Supernova, 1:46
Lemon Slice Nebula, 1:38
NGC 300, 1:44
NGC 6231, 1:39
101 weirdest cosmic objects, 1:37–47
Pencil Nebula, 1:37
PG 1634+706, 1:41
Red Spider Nebula, 1:40
Rho Ophiuchi Region, 1:41
SagDIG, 1:40
Saturn Nebula, 1:38
Sculptor Dwarf, 1:42
Snake Nebula, 1:44
Spirograph Nebula, 1:43
SS 433, 1:45
Thor's Helmet, 1:44–45

H

Hallas, Tony
 Reviewing the amazing Stellarvue 180mm refractor, 3:44–47
Harrington, Phil
 Alpha Persei Cluster, 1:8
 Appraising the Origin Home Observatory, 12:24–27
 Crescent Nebula, 1:15
 DwarfLab's lightweight smart scope, 8:44–45
 Dwingeloo 1, 1:10
 Eclipse viewing made simple, 2:46–47
 Egg Nebula, 1:16
 Gyulbudaghian's Nebula, 1:14
 Hoag's Object, 1:11
 The Integral Sign Galaxy, 1:13
 The Intergalactic Wanderer, 1:12
 Jones 1, 1:10
 Jones-Emberson 1, 1:9
 Keenan's System, 1:17
 Maffei 1 and Maffei 2, 1:14
 Mayall's Object, 1:15
 NGC 147 and NGC 185, 1:11
 NGC 1023, 1:9
 NGC 1275 et al., 1:15
 NGC 3079 and Q0957+561, 1:10
 NGC 4151, 1:8
 NGC 4319 and Markarian 205, 1:16
 NGC 4485 and the Cocoon Galaxy, 1:12
 NGC 6826, 1:17
 Northward bound, 2:52
 101 weirdest cosmic objects, 1:8–17
 Our 14th annual Star Products, 10:36–43
 Seyfert's Sextet, 1:16
 Stephan's Quintet, 1:13
 UGC 12914 and UGC 12915, 1:8
 Zwicky's Triplet, 1:12
Hill, Samantha
 Billowing volcanic plumes, 9:11
 NASA reboots Mars sample return, 8:10
 NASA's Lucy discovers surprise asteroid on 'Dinky' flyby, 2:8
Hyman, Randall

Astronomy Magazine Article Author Index 2024

These are the ways our world will end, 3:16–25

J

Jones, Andrew

China's deep-space ambitions, 2:22–27

K

Keller, Warren

Process JWST images like a pro, 9:38–41

Klesman, Alison

Astronomers find six planets orbiting in resonance, 3:8–9

Dwarf galaxies' black holes behave differently, 11:10

Eclipse traffic, 4:12

The Great American Eclipse delivers—Ingram, Texas, 9:20–21

How Rubin will change our view, 6:17

How spectroscopy works, 12:18

Hubble sees hydrogen, 12:9

JWST images a Penguin and Egg, 11:7

NASA's Lucy discovers surprise asteroid on 'Dinky' flyby, 2:8

Top 10 space stories of 2023, 2:12–21

Weighing a middling-mass black hole, 12:10

What interstellar objects can teach us, 6:15

Kuthunur, Sharmila

Chilly summits on mars, 10:7

Cosmic sea creatures, 9:7

Galactic megamergers could explain enormous radio circles, 10:8–9

How DART reshaped Dimorphos, 6:10

NASA's slithering rover, 8:8–9

What time is it on the Moon?, 8:11

M

MacDougal, Douglas

Renaming the Hubble constant, 12:14–23

Marcus, Joseph

Einstein's role, 12:16–17

Renaming the Hubble constant, 12:14–23

Martin, Lucas

Model rocketry takes off in Oregon, 11:44–47

Mata, Daniela

An eclipse with heritage, 9:18

Exploring Turkey's dark-sky delights, 2:36–41

Feather-weight champion, 5:7

Lighting up the Cigar, 7:10

A looney star, 3:11

A magnetic mystery solved, 7:12

Stars of the show, 7:7

A storm you want to stay inside for, 9:11

Telescopes unite, 3:12

Unparalleled look at galactic core, 3:7

N

Nicitopolous, Theo

Bennu's watery past, 10:10

How centaurs sprout their tails, 7:10

O

Astronomy Magazine Article Author Index 2024

Odenwald, Sten

- Bringing the Sun to light, 11:14–23
- The Sun under a spectroscope, 11:18
- The Sun's many crowns, 11:22

O'Meara, Stephen James

- Abell 194, 1:50
- Atoms for Peace Galaxy, 1:54–55
- Barnard's Star, 1:26
- The Boomerang Nebula, 1:52
- The Bullet Cluster, 1:49
- A celestial transference phenomenon, 12:12
- The Cloverleaf, 1:50
- Coalsack Nebula, 1:53
- The Coma Galaxy Cluster, 1:52
- Einstein Cross, 1:51
- Epsilon Eridani, 1:19
- Eta Carinae, 1:51
- FU Orionis, 1:56
- The Gegenschein puzzle, 7:13
- Jewel Box Cluster, 1:50
- Kapteyn's Star, 1:48
- M87, 1:56
- Mice Galaxies, 1:55
- Morehouse's black ring, 10:12
- Nature's eclipse reactions, 9:47
- NGC 5189, 1:57
- 101 weirdest cosmic objects, 1:19, 26, 48–58
- P Cygni, 1:49
- The Ring Nebula's twilight zone, 8:46
- RR Lyrae, 1:54
- A Saturn ring image, 11:48
- Southern Pleiades, 1:55
- A stellar colossus, 2:50
- Streicher 7, 1:54
- Strodtner-Drechsler-Sainty Object 1, 1:58
- T Tauri, 1:53
- Tabby's Star, 1:57
- Tadpole Galaxy, 1:48
- Tropical Novaya Zemlya effects, 3:14
- Ultimate guide to the eclipse, 4:8–13
- Undset's forgotten mountain, 5:14
- Ursa Major Moving Group, 1:56
- The Vela Supernova Remnant, 1:48
- Wolf 359, 1:52

Ostling, William

- Astrophotography and the art of collaboration, 5:40–45

P

Phelan, Joseph

- Astronomers measure a supermassive black hole's spin, 9:8–9

Pommier, Rod

- Mergers and acquisition, 8:25
- Survivors from the Milky Way's birth, 8:22–27

R

Reeves, Robert

- Inside America's unsung space center, 5:36–39
- Lunar lava tube could shelter a future Moon base, 11:8–9

Astronomy Magazine Article Author Index 2024

NASA cancels fully built Moon rover, stunning scientists, 12:8–9

Robert Reeves' Postcards from the Moon, 7:36–39

Ritschel, Kevin

See these super-sized celestial gems, 2:42–45

S

Schur, Chris

Secrets of successful autoguiding, 9:43–46

We test: Starizona's Nexus coma corrector, 10:46–49

Shubinski, Raymond

How to read rainbows, 11:25–27

The rise of astronomical almanacs, 7:24–25

Unistellar's new smart scope reviewed, 5:46–47

Vaonis' new smart scope, 2:48–49

T

Talcott, Richard

Black hole bugaloo, 10:44–45

A blast from the past, 12:36–37

Eclipse perfecto, 9:17

Exploring a cluster conundrum, 9:36–37

Free-floating binary 'planets' baffle theorists, 3:26–27

A hero's buried treasure, 5:26–27

How to view the eclipse, step by step, 4:14–19

Picture perfect, 3:40

Star formation in a new light, 6:36–37

Tiny galaxies pack a huge wallop, 7:26–27

Trouble at the heart of cosmology, 8:36–37

Where the (proto)stars align, 11:36–37

W

Wakeling, Molly

Under dark skies, 7:48

Examining Galileo's TOES, 12:48

Framing the shot, 8:48

Image like Hubble, 6:48

A rainbow of stars, 9:48

Safe solar observing, 2:51

Staring at the Sun, 5:48

What Messier missed, 3:48

Your first astroimaging rig, 10:50

Wenz, John

A burst from a 'blob,' 5:12

A distant black hole awakens, 11:10

Euclid's first vistas, 2:7

Growing globular gems, 10:9

Icy worlds' secrets, 3:10

Io's long, active life, 8:8

JWST peers inside SN 1987A, 6:11

JWST sees strange black holes in the early universe, 5:8–9

JWST spies thick air around rocky world, 9:12–13

Titan's seas have tiny waves, tidal currents, 11:11

Two black holes found dancing in the night, 8:6–7

Venusian volcanism spotted again, 9:10

Wilson, Vicki

A personal Perseids story (The same sky), 3:42–43

Astronomy Magazine Article Author Index 2024

Z

Zastrow, Mark

- Amateurs nab deep-sky nebulous nymphs, 11:12
- Biggest astronomical camera complete, 8:10
- Chang'e 6 nabs first samples from Moon's farside, 10:10–11
- Cosmological simulation milestone, 2:8–9
- A galaxy not yet born, 5:12
- The Great American Eclipse delivers—Torreón, Mexico, 9:18–19
- A hot-headed stallion, 8:5
- Ingenuity's flight log, 5:10–11
- The Milky Way's central black hole could have a hidden jet, 7:8–9
- Neptune's true hues, 6:9
- Odysseus makes epic lunar journey, breaks leg, phones home, 6:8–9
- A planet too big for its star, 3:10
- 'Ring of fire' blazes across the Americas, 3:36–41
- Starship passes reentry test for first time, 9:12–13

Zeiler, Michael

- Astronomy's* atlas of totality, 4:36–49