

Subject Index

1RXS J160929.1-210524 (star), 1:24
4C 60.07 (galaxy pair), 2:24
6dFGS (Six Degree Field Galaxy Survey), 8:18
21-centimeter (neutral hydrogen) tomography, 12:10
93 Minerva (asteroid), 12:18
2008 TC3 (asteroid), 1:24
2009 FH (asteroid), 7:19

A

Abell 21 (Medusa Nebula), 3:70
Abell 1656 (Coma galaxy cluster), 3:8–9, 6:16
Allen Telescope Array (ATA) radio telescope, 12:10
ALMA (Atacama Large Millimeter/sub-millimeter Array), 4:21, 9:19
Alpha (α) Canis Majoris (Sirius) (star), 2:68, 10:77
Alpha (α) Orionis (star). *See* Betelgeuse (Alpha [α] Orionis) (star)
Alpha Centauri (star), 2:78
amateur astronomy, 10:18, 11:48–53, 12:19, 56
Andromeda Galaxy (M31)
 merging with Milky Way, 3:51
 midpoint between Milky Way Galaxy and, 1:62–63
 ultraviolet images of, 12:22
Antarctic Neumayer Station III, 6:19
Anthe (moon of Saturn), 1:21
Aperture Spherical Telescope (FAST), 4:24
APEX (Atacama Pathfinder Experiment) radio telescope, 3:19
Apollo missions, 8:19
AR11005 (sunspot group), 11:79
Arches Cluster, 10:22
Ares launch system, 1:37, 3:19, 9:19
Ariane 5 rocket, 4:21
Arianespace SA, 4:21
Armstrong, Neil A., 2:20
Arp 147 (galaxy pair), 2:20
Arp 194 (galaxy group), 8:21
art, cosmology-inspired, 5:10
ASPERA (Astroparticle European Research Area), 1:26
asteroids. *See also names of specific asteroids*
 binary, 1:32–33
 close approach to Earth, 6:22, 7:19
 collision with Jupiter, 11:20
 collisions with Earth, 1:24
 composition of, 10:55
 discovery of, 5:21
 effect of environment on surface of, 8:22
 measuring distant, 6:23
 moons orbiting, 12:18
 potentially hazardous, 1:21
 striking methane-rich body, 9:55
 web site about, 11:20
astrocombing, 6:32–35
astroimaging
 Block, Adam, 6:46–51

- contest, 9:56–66
 - faint nebulae, 7:46–51
 - astrometry, 9:22
 - astronauts
 - Armstrong, Neil A., 2:20
 - Bolden, Charles, 11:23
 - bone strength, 5:21
 - radiation protection, 3:17
 - astronomy
 - 13 interesting facts regarding, 10:13
 - amateur, 10:18, 11:48–53, 12:19, 56
 - as career, 9:10
 - challenges facing, 10:13, 11:12–13
 - conceptual understanding, 11:16
 - development of, 5:supplement
 - encouraging children to explore, 6:11
 - fostering education in, 12:19
 - future of, 9:11, 11:34–39
 - infrared, 11:13
 - interest in, 6:15, 9:11
 - setbacks as blessings in disguise, 4:16
 - top 10 stories of 2008, 1:28–37
 - X-ray, 11:13
 - Astroparticle European Research Area (ASPERA), 1:26
 - astrophotography, 4:56–61
 - astrophysics, 8:10, 11:48–53
 - ATA (Allen Telescope Array) radio telescope, 12:10
 - Atacama Large Millimeter/sub-millimeter Array (ALMA), 4:21, 9:19
 - Atacama Pathfinder Experiment (APEX) radio telescope, 3:19
 - Auriga the Charioteer (constellation), 1:80
 - aurorae
 - electrical currents, 8:22
 - lack of symmetry, 11:20
 - radiation exposure, 11:55
 - on Saturn, 3:20
- ## B
- balloons, testing of new high-atmospheric, 5:21
 - barred spiral galaxies
 - Coddington's Nebula, 3:70
 - formation of bars in, 6:45
 - Maffei 2, 4:79
 - Barringer Medal, 12:19
 - BBWo 56, 7:72
 - BD +20 307 (binary star system), 1:23
 - Beagle2 lander, 4:24
 - Bear Claw Galaxy (NGC 2537), 10:79
 - Beehive Cluster, 4:66
 - Beta (β) Centauri (star), 2:78
 - Beta (β) Orionis (Rigel) (star), 12:72
 - Betelgeuse (Alpha [α] Orionis) (star)
 - image of, 12:72
 - observing open star clusters near, 2:68
 - overview of, 2:16, 11:26
 - shrinkage of, 10:21

- Big Bang theory
 - cosmic microwave background, 4:48–51
 - cyclical model, 4:28–33
 - giant blob of gas discovered, 8:22
- binary asteroids, 1:32–33
- binary star systems
 - BD +20 307, 1:23
 - discovery of, 2:24
 - observing, 8:15
 - protoplanetary disks, 10:25
 - supernovae in, 10:54
- black holes
 - binary system of, 6:20
 - at center of galaxies, 5:21
 - at center of Milky Way, 4:26
 - compared to dark matter, 6:45
 - detecting, 8:48
 - discovery of, 5:62
 - early, 12:19
 - effect of merging galaxies on, 7:45
 - illumination of gas blobs, 10:26
 - intermediate-sized, 10:21
 - mergers of, 6:18
 - radiation jets emanating from, 8:21
 - size and shape of, 1:62–63
 - spin of, 10:55
 - strength of, 4:52–53
 - supermassive, 9:19, 12:19, 44
- Blackeye Galaxy (M64), 3:71
- Block, Adam, 6:46–51
- Block Island meteorite (feature on mars), 12:23
- Boattini (comet), 1:91
- Bode's Galaxy (M81), 2:60–63
- Bolden, Charles, 11:23
- Bonanza* (television show), 11:68
- Bromm, Volker, 10:13
- Broughton (comet), 10:79
- brown dwarf stars
 - coolest known, 8:19
 - dimmiest observed, 4:24

C

- Cabrol, Nathalie, 12:10
- Callisto (moon of Jupiter), 5:87
- Canada Post, 8:18
- carbon dioxide (CO₂), discovered on extrasolar planet, 3:18
- Carina Nebula (NGC 3372), 1:20, 10:10–11
- Cassini spacecraft
 - backup propulsion thrusters, 7:19
 - Enceladus, 1:21, 3:32–34
 - firing of engine for 100th time, 6:19
 - web site, 9:21
- Cassiopeia A (Cas A) (supernova remnant), 1:26
- Catalina Sky Survey, 5:21, 12:19
- Cederblad 90 (emission nebula), 2:79

Astronomy Magazine 2009 Index

Cederblad 214 (emission nebula), 8:71
Celestron Acquisition, LLC, 7:64
Celestron Omni XLT 127 telescope, 12:54–55
Centaurus (constellation), observing objects within, 5:75
Centaurus A (NGC 5128) (galaxy), 11:80
Cepheid variables, 9:48–53
Cepheus (constellation), 2:77, 10:66–67
Chandra X-ray Observatory
 10th anniversary of, 11:23
 image of Tarantula Nebula, 4:22
Chandrayaan-1 (lunar probe)
 arrival at Moon, 2:25
 images of permanently shadowed craters, 5:21
 loss of contact with, 12:19
Chang'e-1 (lunar probe), 7:19
Chang'e-2 (lunar probe), 3:17
China
 radio telescope, 4:24
 space program, 1:22
Cigar Galaxy (M82), 2:60–63
Cluster mission, extension of, 6:19
CMB (cosmic microwave background), 4:48–51
CMEs (coronal mass ejections), three-dimensional measurements of, 8:19
CO₂ (carbon dioxide), discovered on extrasolar planet, 3:18
COBE (Cosmic Background Explorer), 6:11
Coddington's Nebula (IC 2574) (barred spiral galaxy), 3:70
Coma Berenices (star cluster), 4:68
Coma galaxy cluster (Abell 1656), 3:8–9, 6:16
Comet 144P/Kushida, 10:79
Comet C/2006 OF2 (Broughton), 10:79
Comet C/2007 N3 (Lulin), 6:70, 7:70
Comet C/2007 W1 (Boattini), 1:91
Comet Holmes, 2:26
Comet Wild 2, 12:23
comets. *See also names of specific comets*
 amateur discoveries of, 12:19
 amino acid glycine found in, 12:23
 collision with Jupiter, 11:20
 collisions with Earth, 5:28, 10:21, 11:26
 discovery of, 2:23, 6:10
 long-period, 11:26
 observing, 12:50–53
 silicate crystals in, 9:19
 web site about, 11:20
computed tomography (CT), 5:22
constellations, observing, 4:54–55. *See also names of specific constellations*
coronal mass ejections (CMEs), three-dimensional measurements of, 8:19
CoRoT (Convection Rotation and planetary Transits) satellite, 2:26
COROT-7b (extrasolar planet), 6:18
Cosmic Background Explorer (COBE), 6:11
Cosmic Dark Ages, 10:13
cosmic microwave background (CMB), 4:48–51
cosmic radio background, 5:27
cosmic rays, 5:28
cosmic structure, 12:11
cosmology

- art inspired by, 5:10
- importance of, 8:11
- interest in, 8:10, 12:11
- Crab Nebula (M1), 12:68
- craters. *See also names of specific craters*
 - locating under dense tree cover, 3:19
 - on Mars, 2:27
- CT (computed tomography), 5:22
- CTA 1 (supernova remnant), 2:22
- CTB1 (supernova remnant), 3:71
- Cullen, Steve, 11:70
- Curiosity rover, 9:19
- Czech Republic, joins ESA, 2:24

D

- Danly, Laura, 6:11
- Daphnis (moon of Saturn), 10:25
- Dark Doodad (HMSTG 436), 10:77
- dark energy
 - astrocombing, 6:32–35
 - confirmation of existence of, 4:21
 - expansion of universe, 2:34–39
 - role in development of universe, 4:48–51
 - study of, 10:12
- dark flow, 1:31
- dark matter
 - clumping, 2:54–55
 - compared to black holes, 6:45
 - effect on dwarf galaxies, 1:23, 7:21
 - overview of, 11:28–33
 - possible source of cosmic rays, 3:16
 - role in development of universe, 4:48–51
 - study of, 10:12
- dark nebulae
 - in Aquila, 6:71
 - view from Earth if located within, 3:50
- Dawn spacecraft
 - approaches Mars, 3:17
 - overview, 8:20
 - preview of, 1:37
- DayStar Quantum filter, 3:60–61
- Deimos (moon of Mars), 7:19
- Deis, Brian, 5:81
- Denkmeier Optical, 6:69
- diamonds, 5:28
- digital interferometry, 7:45
- DLA-3C286 (protogalaxy), 1:24
- Dolidze 8 (open cluster), 2:75
- Dumbbell Nebula (M27), 4:76
- dunes
 - on Mars, 9:19
 - snow and ice trapped in, 11:23
 - on Titan, 6:22
- Dupree, Andrea, 9:10
- dwarf galaxies

- effect of dark matter on, 7:21
- formation of, 6:18
- gravitational interactions between, 11:24
- Leo I, 8:71
- Segue 1, 1:22

dwarf planets (plutoids), 1:21

E

Earth

- early atmosphere, 7:19
- historic image of, 3:17
- Rare Earth hypothesis, 4:34–39
- transit of Sun by, 1:62

Earth Day, 8:19

eclipses

- of 2009, 1:14
- lunar, 2:76
- solar, 3:14–15, 7:56–59, 9:54–55, 11:56–59, 77

Edgar Wilson Award, 12:19

elliptical galaxies

- Maffei 1, 4:79
- NGC 147, 11:76

emission nebulae. *See names of specific emission nebulae*

Enceladus (moon of Saturn)

- approach of Cassini, 1:21, 3:32–34
- possible underground ocean, 10:20

Endeavour Science Teaching Certificate Project, 3:17

Enright, Leo, 10:18

EON 80 mm Extra-Low Dispersion Apochromatic Refractor Telescope, 6:60–61

Epsilon (ϵ) Aurigae (star), dimming of, 10:48–53

Epsilon Eridani planetary system, 2:23

equinoxes

- Earth, 1:88
- Saturn, 12:19

ESA. *See* European Space Agency (ESA)

Eta Carinae Nebula (NGC 3372), 1:20, 10:10–11

ethyl formate, 8:19

European Southern Observatory

- 40th anniversary of, 7:19
- fast camera, 10:25
- X-shooter, 9:19

European Space Agency (ESA)

- Czech Republic joins, 2:24
- partnership with NASA on robotic Mars missions, 4:24

ExoMars Rover, 2:23

extrasolar planets (exoplanets)

- atmospheres of, 5:11, 7:21
- data archive of, 10:21
- discovery of, 1:24, 30–31, 2:25, 8:19, 22
- discovery of hottest known, 2:26
- discovery of smallest, 6:18
- discovery of via astrometry, 9:22
- discovery of via gaps in parent star's accretion disk, 2:28–33
- first direct images of, 3:17
- glow of distinguished from host star, 5:21

- loss of mass, 8:19
- molten surfaces of, 2:23
- most compact observed, 4:25
- search for, 5:11

Extremely Large Telescope, 3:19

F

Falcon 1 rocket, 1:26
FAST (Aperture Spherical Telescope), 4:24
Ferguson, Annette, 5:10
Fermi Gamma-ray Space Telescope

- detects pulsar that emits only gamma rays, 2:22
- discovery of pulsars by, 5:21
- high-resolution map of gamma-ray sky, 7:21
- overview of, 1:34–35

Figer, Don, 9:10
Fox, Derek, 7:11
Frank, Adam, 6:10
Frattare, Lisa, 4:11

G

Gabriela Mistral Nebula (NGC 3324), 1:20, 4:80
Gaensler, Bryan, 9:10
galaxies. *See also names of specific galaxies*

- black holes at center of, 5:21, 7:45
- brightness of center of, 9:54
- collisions between, 10:20, 11:23, 56–59
- dust tendrils, 1:20
- formation of, 8:20
- future of study of, 5:10
- Green Peas, 11:23
- massive compact, 12:21
- ultra-distant, 8:14
- within Ursa Major constellation, 5:64–67
- visible from earth without optical magnification, 11:18–19

galaxy clusters. *See also names of specific galaxy clusters*

- collisions between, 8:19
- dark flow, 1:31
- observing, 3:52–55

galaxy pairs

- 4C 60.07, 2:24
- Arp 147, 2:20

Galaxy Zoo project, 6:22, 11:23
Galilei, Galileo

- building replica of telescope used by, 5:74
- map of Orion, 2:66
- observations of, 5:30–35
- overview, 8:60
- retracing footsteps of in Italy, 5:56–61

Gallagher, Jay, 5:10
gamma-ray bursts (GRBs)

- brightest detected, 1:35–36, 8:19
- dark, 10:24
- dim, 2:23
- gas molecules in host galaxy, 5:28

Astronomy Magazine 2009 Index

- most distant detected, 9:19
- most powerful observed, 6:21
- origins of, 11:25
- Garver, Lori, 11:23
- gas blobs
 - discovery of giant, 8:22
 - illumination of, 10:26
- Gaskell, Robert, 10:12
- Gassendi walled plain (feature on Moon), 5:83
- Gates, Evalyn, 10:12
- Ghez, Andrea, 8:11
- Giant Magellan Telescope, 11:23
- Gliese 581 e (extrasolar planet), 8:22
- globular clusters
 - gamma rays detected in, 12:20
 - M19, 1:91
 - Omega Centauri, 2:10–11
 - stars orbiting within, 4:52
- GLONASS (global navigation array), 4:21
- GOCE (Gravity Field and Steady-State Ocean Circulation) space mission
 - electric ion propulsion thrusters, 8:19
 - launch date, 2:22
- Goddard Space Flight Center, 50th anniversary of, 9:19
- Google Lunar X PRIZE, 3:18
- GOSAT (Greenhouse Gases Observing Satellite), 5:21
- Gran Telescopio Canarias, 11:24
- gravitational lens systems, 1:30
- gravity
 - gravitational theory, 3:22–27
 - gravitational waves, 12:21
 - study of, 9:11
- Gravity Field and Steady-State Ocean Circulation space mission. *See* GOCE (Gravity Field and Steady-State Ocean Circulation) space mission
- GRB 080319B (gamma-ray burst), 1:35–36
- GRBs. *See* gamma-ray bursts (GRBs)
- Green Peas (galaxies), 11:23
- Greenhouse Gases Observing Satellite (GOSAT), 5:21

H

- H α (Hydrogen-alpha) filters, 3:60–61
- Hartmann, William K., 12:19
- HAT-P-7b (extrasolar planet), 12:21
- HAT-P-11b (extrasolar planet), 5:28
- Haumea (dwarf planet), 1:21
- HD 80606b (extrasolar planet), 5:21
- HD 189733b (extrasolar planet), 3:18
- Helfand, David, 4:11
- heliopause, 2:55
- heliosphere, 2:55
- Helix Nebula (NGC 7293), 10:75
- Hendrix, Andrea, 9:11
- Hercules Cluster (M13), 9:79
- Herschel, William, 1:16–17
- Herschel Space Observatory
 - launch of, 9:23

Photoconductor Array Camera and Spectrometer, 10:21
Herschel's Garnet Star (Mu [μ] Cephei), 2:77
HMSTG 436 (Dark Doodad), 10:77
Holmes (comet), 2:26
Hornschemeier, Ann, 4:10
HR 8799 (star), 7:44
Hubble Space Telescope (HST)
 final repairs to, 1:37
 final servicing mission to, 9:18, 36–39
 image of Arp 147 galaxy pair, 2:20
 images captures since refurbishment, 12:24–29
 possibility of retrieving, 12:44
 public vote for target, 6:19
Huntington Library of San Marino, California, 2:26
Huterer, Dragan, 8:10
Hydrogen-alpha ($H\alpha$) filters, 3:60–61
HyperStar lens system, 4:62–65

I

IBEX (Interstellar Boundary Explorer) mission, 1:24
IC 446 (reflection nebula), 7:71
IC 1287 (reflection nebula), 12:69
IC 1396 (emission nebula), 5:12–13
IC 1459 (galaxy cluster), 7:70
IC 2177 (Seagull Nebula), 11:79
IC 2220 (Toby Jug Nebula), 5:86
IC 2574 (Coddington's Nebula), 3:70
IC 2948 (Running Chicken Nebula), 6:71
IC 4592 (reflection nebula), 1:90–91
IC 4601 (reflection nebula), 1:90–91
IC 5067-70 (Pelican Nebula), 1:89
Icarus (asteroid), 11:55
India
 Chandrayaan-1 lunar probe, 2:25, 5:21, 12:19
 possible manned lunar exploration, 3:17
infrared astronomy, 11:13
Integral satellite, 2:23
International Astronomical Union, 12:19
International Dark Sky Association, 11:23
International Dark Sky Communities, 11:23
International Space Station (ISS)
 air monitor, 3:19
 avoids space junk, 1:21
 brightness of, 7:21
 maintenance of by private companies, 4:21
 space tourism to, 2:26
International Year of Astronomy 2009, 1:37, 4:21, 8:18
Interstellar Boundary Explorer (IBEX) mission, 1:24
interstellar medium (ISM), 5:63
Io (moon of Jupiter), volcanic activity of, 5:62
iOptron Corp MiniTower (telescope mount), 2:64–65
Iran, launch of first satellite, 5:26
ISM (interstellar medium), 5:63
ISS. *See* International Space Station (ISS)

J

James Webb Space Telescope (JWST), 7:21
Jewel Box Cluster (NGC 4755) (open cluster), 3:71
Johnson, Kelsey, 11:12
Jules Verne (spacecraft), 1:21
Jupiter
 comet or asteroid strike, 11:20
 core of, 3:17
 future NASA/ESA mission to, 7:20
 image of in front of southern Milky Way, 12:71
 image of with Callisto (moon), 5:87
 image of with Moon and Venus, 5:84–85
 image of with moons, 12:70
 Io (moon), volcanic activity of, 5:62
 observing moons of, 11:66
 sharp ground-based images of, 1:21
JWST (James Webb Space Telescope), 7:21

K

Kaguya spacecraft, 10:20–21
Kaluza-Klein (KK) particles, 3:16
Kasatochi (volcano on Earth), 5:18–19
Keck II telescope, 2:23
Keenan's System (double galaxy [NGC 5216 and NGC 5218]), 1:88
Kepler, Johannes, 1:56–59
Kepler satellite
 ability to detect Earth-sized planets, 12:21
 beginning of mission, 9:19
 first images from, 8:18
 preview of, 1:37
Kewley, Lisa, 7:11
KK (Kaluza-Klein) particles, 3:16
Kolb, Rocky, 12:11
Kollmeier, Juna, 12:11
Kushida (comet), 10:79

L

Lappin, Teresa, 12:56
LCROSS (Lunar Crater Observing and Sensing Satellite), 10:23
Lederman, Russ, 6:69
Leo I (dwarf galaxy), 8:71
LER. *See* Lunar Electric Rover (LER)
Levy, David, 6:10
life, origin of, 9:24–29
light
 overview, 5:16
 speed of, 8:49
 wave-particle duality of, 7:34–35
light pollution, 2:56–59
LightBuckets, 11:70
liquid telescope mirrors, 10:55
Livio, Mario, 11:12
long-baseline interferometry, 4:53
LRO (Lunar Reconnaissance Orbiter) spacecraft, 10:23, 11:22
Lulin (comet), 6:70, 7:70

Lunar Crater Observing and Sensing Satellite (LCROSS), 10:23
lunar eclipses
 of 2009, 1:14
 images of, 2:76
Lunar Electric Rover (LER)
 overview, 6:20
 prototype driven in presidential inaugural, 5:21
lunar rainbows (moonbows), 8:62–63
Lunar Reconnaissance Orbiter (LRO) spacecraft, 10:23, 11:22
Lupica, Joseph A., 7:64

M

M1 (Crab Nebula), 12:68
M13 (Hercules Cluster), 9:79
M17 (Omega Nebula), 4:23
M19 (globular cluster), 1:91
M20 (Trifid Nebula), 12:70
M27 (Dumbbell Nebula), 4:76
M31. *See* Andromeda Galaxy (M31)
M33 (Triangulum Galaxy), 11:54
M37 (Salt and Pepper Cluster), 10:76
M42 (Orion Nebula), 5:88
M45 (Pleiades star cluster), 10:76, 12:16
M48 (NGC 2548) (open cluster), 3:71
M50 (open cluster), 12:69
M51 (Whirlpool Galaxy), 10:21
M61 (spiral galaxy), 11:79
M64 (Blackeye Galaxy), 3:71
M74 (spiral galaxy), 11:10–11
M78 (reflection nebula), 4:77
M81 (Bode's Galaxy), 2:60–63
M82 (Cigar Galaxy), 2:60–63
M83 (Southern Pinwheel Galaxy), 9:79
M87 (galaxy)
 size of, 10:21
 source of flares, 10:27
M88 (spiral galaxy), 11:78
M101 (spiral galaxy), 8:70
M136 (open cluster), 4:79
Ma, Clara, 9:19
Maffei 1 (elliptical galaxy), 4:79
Maffei 2 (barred spiral galaxy), 4:79
magnetars
 discovery of, 5:28, 10:25
 visible light from, 1:26
magnetic fields
 on ancient Moon, 5:22
 in protogalaxies, 1:24
Mainzer, Amy, 10:12
Marcy, Geoff, 5:11
Mare Humorum basin (feature on Moon), 5:83, 12:71
Maris, Vic, 9:74
Mars
 Block Island meteorite, 12:23
 carbon dioxide plumes, 7:18

- challenges of manned spaceflight to, 8:30–35
- conjunction with Venus and Mercury, 2:76
- Deimos (moon), 7:19
- dust storms, 8:22
- evidence of glaciers on, 3:20
- future missions to, 6:16
- ice on, 6:19
- image of, 1:89
- impact crater buried under ice, 2:27
- interest in, 12:11
- meteorite impact, 7:19
- methane in atmosphere of, 4:20
- Olympus Mons (mountain), 6:44, 12:45
- Phobos (moon), 2:23
- possible human exploration of, 2:26, 3:16
- potential microbial life in rock varnishes on, 4:20
- repeated climate change on, 4:21
- Resolution Crater, 9:22
- results of exploration of, 10:34–39
- sand dunes on, 9:19
- Victoria Crater, 12:19
- water, 1:22, 7:18, 44, 9:54
- Mars Atmosphere and Volatile Evolution (MAVEN) mission, 1:24
- Mars Express orbiter
 - extension of mission, 6:19
 - images of Phobos, 2:23
- Mars Odyssey orbiter
 - evidence of ancient ocean, 3:17
 - reboot of, 7:18
- Mars Science Laboratory (MSL) mission
 - Curiosity rover, 9:19
 - delay of, 4:22
 - potential sites for, 1:21
 - preview of, 1:37
- Mather, John, 6:11
- MAVEN (Mars Atmosphere and Volatile Evolution) mission, 1:24
- MCAO (Multi-Conjugate Adaptive Optics) method, 1:21
- McAuliffe-Shepard Discovery Center, 6:19
- McElheny, Josiah, 5:10
- McNeil, Jay, 11:48–53
- Medusa Nebula (Sharpless 2-274; Abell 21) (planetary nebula), 3:70
- Mercury. *See also* MESSENGER (Mercury Surface, Space Environment, Geochemistry, and Ranging) spacecraft
 - conjunction with Venus and Mars, 2:76
 - image of with Moon, 4:78
 - images of, 10:76
 - impact basin on, 9:18
 - magnesium on, 9:19
- MESSENGER (Mercury Surface, Space Environment, Geochemistry, and Ranging) spacecraft
 - overview, 1:28, 32–33
 - passes 3 billion travel miles, 4:26
 - second flyby of Mercury, 1:22, 2:20, 3:28–30
- Messier, Charles, 8:54–57
- Messier objects, observing, 3:63
- meteorites
 - age of interstellar grains trapped in, 10:21
 - authenticity of, 4:52

- impact on Mars, 7:19
- meteors, 3:19
- Methone (moon of Saturn), 1:21
- Michelson, Albert Abraham, 11:68
- Milky Way Galaxy
 - cold dust, 11:26
 - evolution of understanding of, 12:14
 - formation of stars at center of, 4:25
 - infrared panoramic view of center, 5:26
 - mapping, 10:28–33
 - merging with Andromeda, 3:51
 - midpoint between Andromeda Galaxy and, 1:62–63
 - movement of solar system through, 1:63
 - newborn stars at center of, 10:22
 - number of stars in, 2:54
 - observing, 9:70, 12:46–48
 - rotation of, 4:23
 - running out of gas, 1:38–43
 - size of, 4:23
 - weight of black hole at center of, 4:26
- Mirach's Ghost (NGC 404), 7:71
- Monoceros (constellation), 2:68
- Moon (Earth's)
 - age of crust, 6:16
 - ancient magnetic field of, 5:22
 - Asian exploration of, 8:50–52
 - concrete made from lunar soil, 2:23
 - dark appearance in 1761, 5:24
 - eclipses of, 1:14, 2:76
 - effect of direct sunlight on lunar dust, 8:19
 - image of, 1:89
 - image of features on, 5:83
 - image of with Mercury, 4:78
 - image of with Venus and Jupiter, 5:84–85
 - images of, 10:76
 - lunar rainbows, 8:62–63
 - Mare Humorum (basin), 12:71
 - mosaic image of, 2:79
 - observing imperfections of, 6:14
 - returning to, 8:24–29
 - sharpening observation skills of, 10:60–63
 - solar wind, 10:21
 - uranium on, 10:21
- moonbows (lunar rainbows), 8:62–63
- moons. *See names of specific moons*
- Moreo, Peter, 4:74
- Mount Wilson Observatory, centennial of, 2:23
- Mountain, Matt, 4:11
- mountains, determining elevation of, 8:49
- MSL. *See Mars Science Laboratory (MSL) mission*
- Mu (μ) Cephei (Herschel's Garnet Star), 2:77
- Multi-Conjugate Adaptive Optics (MCAO) method, 1:21
- multiverse theory, 6:24–29
- multiwavelength astronomy, 4:10
- Murchison meteorite, 10:21

N

- N44 (emission nebula), 8:72
- Nagler, David, 10:68
- Najita, Joan, 8:11
- NASA (National Aeronautics and Space Administration)
 - budget of, 7:19, 9:22
 - cooperation with South Korea, 2:23
 - Endeavour Science Teaching Certificate Project, 3:17
 - new administrator of, 11:23
 - partnership with ESA on robotic Mars missions, 4:24
 - partnerships with commercial researchers, 3:18
 - space-inspired art, 1:21
 - video show, 5:20
 - web site about near-Earth asteroids and comets, 11:20
- nebulae. *See also names of specific nebulae*
 - discovery of, 2:78
 - imaging, 7:46–51
 - shape of, 8:48
- Neptune
 - discovery of, 10:64
 - Triton (moon), 9:55, 12:19
- neutral hydrogen (21-centimeter) tomography, 12:10
- neutrinos, 12:30–35
- New Horizons spacecraft
 - mission, 3:50
 - model of, 2:23
 - passes one-third duration of journey, 7:19
- NGC 147 (elliptical galaxy), 11:76
- NGC 253 (Sculptor Galaxy), 2:75, 11:76
- NGC 404 (Mirach's Ghost), 7:71
- NGC 457 (Owl Cluster), 10:75
- NGC 1023 (spiral galaxy), 12:68
- NGC 1316 (galaxy), 4:78
- NGC 1317 (galaxy), 4:78
- NGC 1491 (emission nebula), 5:83
- NGC 2070 (Tarantula Nebula), 1:10–11, 4:22
- NGC 2170 (nebula), 6:72
- NGC 2237-9 (Rosette Nebula), 7:71
- NGC 2516 (open cluster), 8:70
- NGC 2537 (Bear Claw Galaxy), 10:79
- NGC 2548 (M48) open cluster, 3:71
- NGC 2818 (planetary nebula), 5:20
- NGC 2841 (spiral galaxy), 10:77
- NGC 3324 (Gabriela Mistral Nebula), 1:20, 4:80
- NGC 3372 (Eta Carinae Nebula), 1:20, 10:10–11
- NGC 3576 (emission nebula), 1:92
- NGC 3766 (Pearl Cluster), 6:70
- NGC 3938 (spiral galaxy), 5:87
- NGC 4214 (irregular galaxy), 10:78
- NGC 4755 (Jewel Box Cluster) open cluster, 3:71
- NGC 4921 (spiral galaxy), 6:16
- NGC 5128 (Centaurus A) galaxy, 11:80
- NGC 5139 (Omega Centauri) globular star cluster, 2:10–11
- NGC 5216 (galaxy), 1:88
- NGC 5218 (galaxy), 1:88

NGC 5367 (reflection nebula), 10:78
NGC 5367 (refraction nebula), 6:71
NGC 5907 (spiral galaxy), 2:80
NGC 5921 (spiral galaxy), 10:77
NGC 5985 (spiral galaxy), 5:87
NGC 6604 (open cluster), 7:71
NGC 6914 (reflection nebula), 2:75
NGC 6914A (reflection nebula), 2:75
NGC 6914B (reflection nebula), 2:75
NGC 7293 (Helix Nebula), 10:75
NGC 7822 (open cluster), 8:71
Nobel Prize, 6:11, 11:68
North Korea, space program, 6:19
Northern Cross (asterism), 12:58–59
n-propyl cyanide, 8:19

O

observation, astronomical
 109 deep-sky objects to observe in October, 10:56–59
 2010 Sky Guide, 12:supplement
 of planets in 2009, 1:14
 by readers, 9:68–69
 of reflection nebulae, 1:64–68
 of Sun, 1:63
 of Venus, 1:78
 of winter sky, 1:70–71
observatories, backyard, 3:56–59. *See also names of specific observatories*
Occam's Razor, 9:14
Odyssey spacecraft, new orbit for, 10:21
Olympus Mons (feature on Mars), 6:44, 12:45
Omega Centauri (NGC 5139) globular star cluster, 2:10–11
Omega Nebula (M17), 4:23
Omni XLT 127 telescope, 12:54–55
open clusters. *See names of specific open clusters*
Ophiuchus (constellation), 6:45
Opportunity rover
 begins journey toward Endeavour crater, 1:21
 fifth anniversary of, 4:21
Orion (constellation)
 image of, 8:71, 12:72
 maps of, 2:66
Orion EON 80 mm Extra-Low Dispersion Apochromatic Refractor Telescope, 6:60–61
Orion Molecular Cloud, 8:22
Orion Nebula (M42), 5:88
Orion SkyQuest XX12 Intelliscope, 8:58–59
Orion StarBlast 6 telescope, 1:72–73
Orion Telescopes & Binoculars, 4:74
Oso Observatory, 10:18
Owl Cluster (NGC 457), 10:75

P

PACS (Photoconductor Array Camera and Spectrometer), 10:21
PanSTARRS (Panoramic Survey Telescope and Rapid Response System), 4:24
parallax effect, 5:63
parsecs, 5:63

- particle physics, 4:10
 - Pearl Cluster (NGC 3766), 6:70
 - Pelican Nebula (IC 5067-70), 1:89
 - Perseus galaxy cluster, 4:79
 - Phobos (moon of Mars), 2:23
 - Phoenix lander
 - overview of, 1:28–29, 36
 - shutdown of, 2:23
 - Photoconductor Array Camera and Spectrometer (PACS), 10:21
 - Pilachowski, Caty, 10:13
 - Pioneer 10 (space probe), anomalous slowing of, 3:24–26
 - Pioneer 11 (space probe), anomalous slowing of, 3:24–26
 - Planck spacecraft
 - detectors reach final operating temperature, 10:25
 - launch of, 9:23
 - planetary nebulae. *See also names of specific planetary nebulae*
 - observing, 7:52–54
 - study of, 6:10
 - Planetary Society, 2:26
 - planets. *See also names of specific planets*
 - collision of, 12:22
 - collisions of, 1:23
 - formation of, 8:11
 - formation of giant gas planets, 5:22
 - ingredients needed for the formation of earthlike, 5:24
 - mapping, 10:12
 - observing in 2009, 1:14
 - role of colliding gas clouds in formation of, 3:20
 - wind present on, 3:12
 - Pleiades star cluster (M45), 10:76, 12:16
 - Pluto, atmosphere of, 6:21
 - plutoids (dwarf planets), 1:21
 - Porco, Carolyn, 6:10
 - Procyon (star), 2:68
 - Progress (robotic resupply ship), 3:17
 - protogalaxies, 1:24
 - protoplanetary disks, 8:21, 10:25
 - pulsars
 - millisecond, 11:23
 - that emit only gamma rays, 2:22
- R**
- radiation, protecting astronauts from, 3:17
 - radio astronomy, 4:11
 - radio telescopes
 - Atacama Pathfinder Experiment, 3:19
 - largest, 4:24
 - overview of, 2:54
 - Rancho Hidalgo Observatory, New Mexico, 6:56–59
 - Randall, Lisa, 4:10
 - Rare Earth hypothesis, 4:34–39
 - reality, 7:14
 - reflection nebulae, observing, 1:64–68. *See also names of specific reflection nebulae*
 - Regulus (star), 1:89
 - relativity, theory of, 5:16

Resolution Crater (feature on Mars), 9:22
Riess, Adam, 8:11
Rigel (Beta [β] Orionis) (star), 12:72
rings
 discovery of extrasolar planets via, 2:25
 Saturn, 3:62, 6:19, 10:25, 54
robotic telescope systems, 7:28–33
rock varnishes, 4:20
Roscosmos (Russian space agency), 3:17
Rosenbaum, Gary, 12:56
Rosenthal, Joan-Allen, 6:15
Rosette Nebula (NGC 2237-9), 7:71
runaway stars, 5:25
Running Chicken Nebula (IC 2948), 6:71
Russia, space tourism, 5:21

S

Sagittarius (constellation), 2:78
Sagittarius A* (black hole), 4:26
Salman, Dean, 7:46–51
Salt and Pepper Cluster (M37), 10:76
San Pedro Mártir Observatory, 12:19
Sarychev volcano (feature on Earth), 10:24
satellites, collision of, 6:22. *See also names of specific satellites*
Saturn. *See also names of moons orbiting*
 aurorae, 3:20
 equinox of, 12:19
 fascination with, 6:10
 image of, 1:89
 naming of gaps in rings, 6:19
 ring-plane crossing, 3:62
 rotation of, 11:23
 size of ring particles, 10:54
 transit of four moons, 7:19
 vertical structures in rings of, 10:25
Schur, Chris, 4:56–61
Scorpiid meteor shower, 6:62–63
Scorpius (constellation), 10:80
Sculptor Galaxy (NGC 253), 2:75, 11:76
Scutum the Shield (constellation), 6:52–54
Seager, Sara, 5:11
Seagull Nebula (IC 2177), 11:79
Segue 1 (dwarf galaxy), 1:22
shadow bands, 3:14–15, 4:18–19
Shakespeare, William, 7:60
Sharpless 2-64 (emission nebula), 5:86
Sharpless 2-104, 4:76
Sharpless 2-274 (Medusa Nebula), 3:70
Shoemaker, Deirdre, 9:11
Shostak, Seth, 7:10
Shu, Frank, 8:10
Sigma (σ) Octantis (star), 7:45
Simonyi, Charles, 7:19
Sirius (Alpha [α] Canis Majoris) (star), 2:68, 10:77
Sirius B (star), 9:55, 10:77

Astronomy Magazine 2009 Index

- Six Degree Field Galaxy Survey (6dFGS), 8:18
- SkyQuest XX12 Intelliscope, 8:58–59
- SMART (Small Missions for Advanced Research and Technology), 8:44–47
- SN 1572 (supernova), 3:16
- SN 1996cr (supernova), 1:18
- SN 2008D (supernova), 1:37
- solar eclipses
 - of 2009, 1:14, 7:56–59, 11:60–65, 77
 - predicting, 9:54–55
 - shadow bands, 3:14–15
- solar system
 - rearrangement of, 11:24
 - speed and direction of movement, 1:63
 - view of from extrasolar planets, 7:44
- solstices, 1:88, 6:13
- South Korea, cooperation with NASA, 2:23
- Southern Pinwheel Galaxy (M83), 9:79
- space junk
 - collision of two satellites, 6:22
 - International Space Station avoids collision with, 1:21
 - rocket fragment, 3:17
 - tool bag, 3:20
 - tracking, 9:19
- Space Telescope Science Institute, 10:21
- space tourism
 - Garriott, Richard, 2:26
 - last visitor to International Space Station, 5:21
 - maiden flight of WhiteKnightTwo, 4:21
 - Simonyi, Charles, 7:19
- space walks, first by Chinese taikonaut, 1:22
- spacecraft. *See names of specific spacecraft*
- spaceports, 4:20
- SpaceX company, 1:26
- Spica (star), 2:76
- spiral galaxies. *See names of specific spiral galaxies*
- Spirit rover
 - fifth anniversary of, 4:21
 - investigating surroundings while stuck, 10:27
 - reviving of, 8:19
- Spitzer Space Telescope
 - greatest discoveries of, 3:44–49
 - image of Omega Nebula, 4:23
 - loss of liquid helium, 9:21, 11:25
 - observations of Comet Holmes, 2:26
- star clusters. *See also names of specific star clusters*
 - study of, 10:13
 - super, 11:12
- StarBlast 6 telescope, 1:72–73
- Stardust spacecraft
 - display of return capsule, 1:20
 - tenth anniversary of, 6:19
- Starizona HyperStar lens system, 4:62–65
- stars. *See also names of specific stars*
 - brightness of, 6:44
 - Cepheid variables, 9:48–53
 - collapsing, 11:54

- discovery of extrasolar planets via gaps in accretion disk, 2:28–33
- formation of, 8:11, 11:23
- formation of at center of Milky Way, 4:25, 10:22
- formation of massive, 5:25
- hottest observed, 4:21
- hypervelocity, 9:30–35
- image of birth of, 3:19
- images of showing four spikes radiating from, 4:53
- mapping, 6:30–31, 10:12
- naming and cataloging in other galaxies, 8:48–49
- promotion of habitability of planets through death of, 7:22–27
- runaway, 5:25
- simulation of formation of first, 11:24
- smallest, 12:45
- surface vibrations of, 2:26
- warping of debris disks, 12:21
- Wolf-Rayet, 5:62–63
- Steidel, Chuck, 11:13
- stellar magnitude estimates, 6:44
- stellar outbursts, 2:48–53
- Stellarvue, 9:74
- Stephan's Quintet (galaxy group), 11:23
- STEREO satellites, 5:28
- Stonehenge, 2:55
- substorms, 1:34
- Sun
 - corona, 11:77, 12:18
 - Cycle 24, 7:16–17, 19, 10:26
 - eclipses of, 1:14, 3:14–15
 - image of rising behind Parthenon, 12:71
 - observing and imaging, 1:63
 - safety while observing, 7:61
 - sunspots, 7:16–17, 11:79, 12:20
 - termination zone, 2:55
 - transit of by Earth, 1:62
- sunspots, 7:16–17, 11:79, 12:20
- Super Wide Angle Search for Planets (SuperWASP), 2:26
- supernovae. *See also names of specific supernovae*
 - acceleration of particles, 10:25
 - in binary star systems, 10:54
 - brightest, 3:51
 - carbon-rich star, 9:19
 - charting distance through brightness of, 9:21
 - discovery of hidden, 9:20
 - most distant detected, 11:24
 - velocity of shock wave, 3:51
- SuperWASP (Super Wide Angle Search for Planets), 2:26

T

- T Leporis (red-giant star), 6:22
- TAAA (Tucson Amateur Astronomy Association), 12:56
- Tarantula Nebula (NGC 2070), 1:10–11, 4:22
- Tarter, Jill, 12:10
- Tegmark, Max, 12:10
- Tele Vue Optics, 10:68

telescope mounts, 2:64–65
telescopes. *See also names of specific telescopes*
 building replica of Galileo's, 5:74
 development of, 5:36–39
 diameter of, 11:55
 invention of, 5:30–35
 liquid mirrors, 10:55
 robotic, 7:28–33
 solar observing and imaging with, 1:63
 top 25, 5:68–73
termination shock, 2:55
Thaller, Michelle, 7:10
Thirty Meter Telescope project, 11:23
Tiangong orbital laboratory module, 1:22
tides, 9:16
Titan (moon of Saturn)
 clouds on, 6:23, 9:18, 12:22
 dunes on, 6:22
 lakes on, 6:23
 methane in atmosphere of, 5:20
 requirements for supporting life, 12:45
 volcanoes on, 4:26, 7:21
T-minus (graphic novel), 6:19
Toby Jug Nebula (IC 2220) (reflection nebula), 5:86
Triangulum Galaxy (M33), 11:54
Trifid Nebula (M20), 12:70
Triton (moon of Neptune), 9:55, 12:19
Tucson Amateur Astronomy Association (TAAA), 12:56
Tunguska comet impact, 10:21
Tyson, Neil deGrasse, 7:11

U

Ulysses spacecraft, shutdown of, 10:21
universe
 cyclical model of, 4:28–33
 dustiness of, 6:22
 expansion of, 2:34–39
Universo (radio program), 3:17
Uranus
 equinox of, 2:23
 Sir William Herschel's observations of, 1:16–17
Ursa Major (constellation), observing galaxies within, 5:64–67

V

V838 Monocerotis (star), 2:34–39
Venus
 conjunction with Mercury and Mars, 2:76
 image of with Moon and Jupiter, 5:84–85
 infrared map of, 11:22
 observing, 1:78
Venus Express mission, extension of, 6:19
Victoria Crater (feature on Mars), 12:19
Vietnam, launch of first satellite, 4:21
Virgin Galactic, 4:21
Vixen Optics telescope company, 5:81

volcanoes

- atmospheric effects of, 5:18–19
- Earth, 5:18–19, 10:24
- Io, 5:62
- Moon's dark appearance in 1761, 5:24
- Titan, 4:26, 7:21

W

- WASP-10b (extrasolar planet), 4:25
- WASP-12b (extrasolar planet), 2:26
- WASP-17b (extrasolar planet), 12:18
- WASP-18b (extrasolar planet), 12:21
- water
 - on Mars, 1:22, 7:18, 44, 9:54
 - most distant signs of, 4:21, 8:19
 - from recycled urine, 9:19
- Weaver, Kim, 11:13
- Westerlund 2 star cluster, 2:24
- Whirlpool Galaxy (M51), 10:21
- WhiteKnightTwo (jet plane), 4:21
- Whitney, Barbara, 11:13
- Wild 2 (comet), 12:23
- WISE (Wide-field Infrared Survey Explorer) program, 10:12, 12:20
- W.M. Keck Observatory, 11:13
- Wolf-Rayet stars, 5:62–63
- wreath-shaped features, 2:18–19

X

- XMM-Newton X-ray satellite, 5:28
- X-ray astronomy, 11:13

Y

- YORP (Yarkovsky-O'Keefe-Radzievskii-Paddack) effect, 1:32–33

Z

- zodiacal band, 3:72
- zodiacal light, 1:89

Title Index

A

- Adam Block's awesome universe, 6:46–6:51
- Alien winds, 3:12
- All about M81 and M82, 2:60–2:63
- All-inclusive expedition, An, 2:26
- Amateur outreach, 12:56
- Ancient galaxies mix it up, 2:24
- Ancient galaxies show strong magnetic hearts, 1:24
- Anti-blur technology sharpens Jupiter, 1:21
- Apollo sample pinpoints lunar crust's age, 6:16
- Applying Occam's razor, 9:14

Arches Cluster more normal than thought, 10:22
Archival search spots supernova, 1:18
Are we there yet?, 4:26
Armstrong's archive, 2:20
Asia's new assault on the Moon, 8:50–8:52
Asteroid buzzes Earth, 6:22
Asteroid upheaval, 11:24
Astronomers capture first exoplanet images, 3:17
Astronomers capture meager spiral, 6:16
Astronomers CT-scan the cosmos, 5:22
Astronomers discover cosmic radio background, 5:27
Astronomers discover planet just twice Earth's diameter, 6:18
Astronomers find a hidden supernova, 9:20
Astronomers find first directly imaged exoplanet in old data, 8:19
Astronomers identify black hole twins, 6:20
Astronomers image springtime on Mars, 7:18
Astronomers measure giant galaxy, 10:21
Astronomers report first optical magnetar, 1:26
Astronomers use GRB to spy molecules, 5:28
Astronomy's 2009 Astroimaging Contest, 9:56–9:66
Astronomy—The next generation, 11:34–11:39
Aurorae are not mirror images, 11:20

B

Baby stars found at galactic center, 10:22
Bard and astronomy, The, 7:60
Beagle2 probe may have spun too fast, 4:24
Beautiful science, 2:26
Betelgeuse blows off steam, 11:26
Betelgeuse: the next banana split?, 2:16
Big brown nothing, The, 9:16
Binary solar system in the making?, 10:25
Black hole ghost, 9:19
Black hole jets observed in new light, 8:21
Black hole radiation lights gas blobs, 10:26
Blob at the cosmic dawn, 8:22
Bonanza night, A, 11:68
Brian Deis, 5:81
Bright stars hide heart of darkness, 2:10–2:11
Bull's-eye on the Red Planet, 12:19

C

Can we win the war against light pollution?, 2:56–2:59
Can you imagine?, 11:16
Cassini flies through Enceladus' geysers, 3:32–3:34
Celestron revives a classic scope, 12:54–12:55
Chandra peers deep into the Tarantula's lair, 4:22
Characterizing twin Earths won't be easy, 7:21
China to build giant dish, 4:24
China's next star in orbit, 1:22
Chris Schur captures the universe, 4:56–4:61
Christmas Cross, The: a matter of life and death, 12:58–12:59
Citizen scientists help discover a new group of galaxies, 11:23
Clues help crack chicken-and-egg galactic mystery, 5:21
Colliding clouds forge planet building blocks, 3:20

Colliding galaxies have shocking good time, 11:23
Comb through Coma Berenices, 4:68
Comet harbors life's building block, 12:23
Comets not to blame for mass extinctions, 11:26
Cosmic weather predictor, 5:28
Crab Nebula and NGC 1023, The, 12:68
Cruise the Milky Way, 9:70
Czechs join ESA, 2:24

D

Dark matter provides cushion for galaxies, 7:21
Dark moon rising, 5:24
David Levy sky, A, 6:15
David Nagler, 10:68
Dawn of a new day, 8:20
Day Earth came to life, The, 9:24–9:29
DayStar's Quantum filter reveals the Sun, 3:60–3:61
Diamonds point to comet impact, 5:28
Did Phoenix spot liquid droplets on Mars?, 7:18
Dimmest brown dwarfs found, 4:24
Dimmest galaxy has a huge mass, 1:23
Discover galaxy groups and clusters, 3:52–3:55
Discover the sky's deepest, darkest secrets, 6:56–6:59
Discovery boosts Milky Way spin and mass, 4:23
Double duty, 4:24
Double the observing fun, 8:15
Dozen cool facts, A, 10:16
Dust rings point to small planets, 2:25

E

Early black holes: smaller and hungrier, 12:19
Edges of the universe, 8:14
Epsilon Aurigae: Astronomy's longest-running mystery show, 10:48–10:53
Epsilon Eridani sports two asteroid belts, 2:23
Europeans propose astroparticle plan, 1:26
Experience Galileo's Italy, 5:56–5:61
Explore 12 great lunar targets, 10:60–10:63
Explore planetary nebulae in Cygnus, 7:52–7:54
Explore the Gem of the Milky Way, 6:52–6:54
Explore the Great Bear's galaxies, 5:64–5:67
Explore the sky's spooky reflection nebulae, 1:64–1:68
Explosion caught in the act, 10:24
Exposing a crater, 3:19
Extrasolar planet tightens its waistline, 4:25
Extreme observing: naked-eye galaxies, 11:18–11:19
Extreme planet, 2:26

F

Facing reality, 7:14
Feast on Saturn, 3:62
Fermi spots first gamma-only pulsar, 2:22
Fermi spots most powerful GRB ever, 6:21
Fermi's high-energy eye maps the sky, 7:21
Find your way through the spring sky, 4:54–4:55
Find your way through the winter sky, 1:70–1:71

Astronomy Magazine 2009 Index

Fireball flares over western Canada, 3:19
Fireballs from the Scorpion, 6:62–6:63
First asteroid tracked into atmosphere, 1:24
First image of planet orbiting a Sun-like star, 1:24
Follow the Charioteer, 1:80
Four moons dance across Saturn's face, 7:19
From darkness to light, 10:10–10:11
Fun-house porch, The, 10:66–10:67

G

Galactic dance may strip stars but leave dark matter, 11:24
Galaxies galore, 3:8–3:9
Galaxies may have formed from primordial gas alone, 6:18
Galaxies NGC 147 and NGC 253, 11:76
Galaxy's dark secret exposed, 1:20
Galileo's Orion, 2:66
Gamma rays detected in globular cluster, 12:20
Gamma-ray bursts are even more mysterious, 11:25
Gas cloud veils giant star pair, 2:24
Gathering storm, A, 8:22
Get ready for the great Asian eclipse, 7:56–7:59
Go deep for faint nebulae with astroimager Dean Salman, 7:46–7:51
GOCE satellite goes underground, The, 2:22
Good vibrations probe stellar interiors, 2:26
Great's life, A, 8:60

H

Helix Nebula and Owl Cluster, The, 10:75
Hercules Cluster and M83, The, 9:79
Herschel and Planck on their way, 9:23
Herschel opens its eye and views the Whirlpool Galaxy, 10:21
High-altitude telescope tunes into star birth, 3:19
How an amateur astronomer changed stellar astrophysics, 11:48–11:53
How asteroids get their color, 8:22
How dying stars bring new planets to life, 7:22–7:27
How Johannes Kepler revolutionized astronomy, 1:56–1:59
How much solstice can you handle?, 6:13
How the Spitzer Space Telescope unveils the unseen cosmos, 3:44–3:49
How the telescope remade the universe, 5:30–5:35
How to build a backyard observatory, 3:56–3:59
How to eyeball Ares on iTunes, 3:19
How to make a solar system, 2:28–2:33
How to observe comets, 12:50–12:53
How we could see another universe, 6:24–6:29
How we mapped the Milky Way, 10:28–10:33
How we see the sky, 6:30–6:31
How we'll return to the Moon, 8:24–8:29
HST back in business, 2:20
Hubble shows off spectacular stellar nursery, 1:20
Hubble sniffs CO₂ in alien air, 3:18
Hubble's grand new vistas., 12:24–12:29
Huge impact basin discovered on Mercury, 9:18

I

IBEX is on its way, 1:24

Ice volcanoes on Titan?, 7:21
Imperfect Moon, An, 6:14
India sends first probe to the Moon, 2:25
Indian summer on Titan, 9:18
Interstellar wind warps dust disks, 12:21
Invasion of the robotic telescopes, 7:28–7:33
iOptron's lightweight mount supports on-the-go observing, 2:64–2:65
Is Earth one of a kind?, 4:34–4:39
Is our galaxy running out of gas?, 1:38–1:43
Is the Big Bang in trouble?, 4:48–4:51
Is there something we don't know about gravity?, 3:22–3:27

J

Joseph A. Lupica, 7:64
Jupiter-like worlds bulk up fast, 5:22

K

Keck image captures equinox on Uranus, 2:23
Kepler begins staring contest, 9:19
Kepler opens its eyes, 8:18
Kepler proves its precision, 12:21
King's stellar cauldron, The, 5:12–5:13
Kingston's astronomical dynamo, 10:18

L

Light echoes reveal Tycho's supernova, 3:16
Light fantastic, 5:16
Light's dual personality, 7:34–7:35
Long-lived star cluster harbors an aged nebula, 5:20
Looking for one object, astronomers discover another, 5:25
Lot more going on in Orion, A, 8:22
LRO takes first Moon images, 11:22

M

Made in Iran, 5:26
Magic times on the Sun, 7:16–7:17
Major mess-ups ... maybe, 4:16
Mapping the Milky Way's cold dust, 11:26
Mars crater comes out of hiding, 2:27
Mars first!, 2:26
Mars rover spies young crater, 9:22
Martian masochists, 3:16
Massive glaciers found on Mars, 3:20
Medicean stars, The, 11:66
Megascopie is top pick for Europe, 3:19
MESSENGER sweeps past Mercury again, 2:20
MESSENGER swings by Mercury for another look, 1:22
Messier madness, 3:63
Methane reveals Red Planet's active innards, 4:20
Milky Way mysteries, 12:14
Milky Way's central black hole gets weighed, 4:26
Mirror image, A, 1:16–1:17
Moonbows: architecture of light, 8:62–8:63
Most distant star blast, 9:19

Astronomy Magazine 2009 Index

Most distant supernovae found, 11:24
Mysterious cosmic rays may originate from dark matter, 3:16

N

NASA on TV, 5:20
NASA revs up new lunar rover, 6:20
NASA seeks new space partners, 3:18
NASA shoots the Moon, 10:23
Near-Earth-sized exoplanet discovered, A, 8:22
New day dawns for Hubble, A, 9:36–9:39
New debris found near galaxy collisions, 10:20
New evidence backs dark energy, 4:21
New evidence pushes back oxygen date for Earth, 7:19
New method found to chart cosmic distances, 9:21
New mission to Mars, 1:24
New planet orbits on wrong-way path, 12:18
New survey reveals cosmic structure, 8:18
New technique closes in on dark energy, 6:32–6:35
New UV view of M31, 12:22
New view of the Milky Way, 5:26
Next planetary flagship mission targets Jupiter, 7:20
Next step Mars?, 8:30–8:35
No gravitational waves, no problem, 12:21

O

Object slams into Jupiter, 11:20
Ocean in Venus' past?, 11:22
Orion's low-cost APO delivers sharp images, 6:60–6:61
Orion's StarBlast 6 makes a great first scope, 1:72–1:73
Orion's truss-tube scope offers power and portability, 8:58–8:59

P

PanSTARRS 1 comes on line, 4:24
Paradise on Block Island, 12:23
Peter Moreo, 4:74
Phases of Venus, The, 1:78
Planck detectors reach their coolest, 10:25
Planet-hunting method snags its first, 9:22
Plasma cloud tracked in 3-D, 8:19
Pluto's full atmosphere revealed, 6:21
Predicting Neptune's existence, 10:64

R

Rare magnetic monster found, 10:25
Readers report 2009, 9:68–9:69
Re-create a Galilean scope, 5:74
Robot scopes see super-Neptune, 5:28
Rock coatings could harbor martian microbes, 4:20
Rocky strata reveal climate change on Mars, 4:21
Roving Mars lab delayed for 2 years, 4:22
Russ Lederman, 6:69

S

Saturn shows off odd aurora, 3:20

Astronomy Magazine 2009 Index

Scientists shed light on dark bursts, 10:24
Scoping out the great discoveries, 5:supplement
Searching for shadow bands, 4:18–4:19
Seeking ground truth on Mars, 10:34–10:39
Serpents of the air, 3:14–3:15
Shadows seen in rings, 10:25
Simulations find some early stars were twins, 11:24
Simulations hint at massive-star formation, 5:25
Sky survey finds dusty universe, 6:22
Solar safety, 7:61
Space sniffer, 3:19
Spaceport go for launch, 4:20
Speedy stars raise some questions, 12:21
Spider's tangled web, The, 1:10–1:11
Spiral designs, 11:10–11:11
Spirit doing science while stuck, 10:27
Spitzer images the Omega Nebula's stormy seas, 4:23
Spitzer peeks inside comet, 2:26
Spitzer sees products of planetary collision, 12:22
Spitzer spots more ingredients of earthlike planets, 5:24
Spitzer: Warm is good, 11:25
Spitzer warms up, 9:21
Spring brings cloudy skies to Titan, 5:20
Stars form in Milky Way's hostile heart, 4:25
Stars that revealed the vastness of the universe, The, 9:48–9:53
Stellar outbursts can create comet crystals, 9:19
Steve Cullen, 11:70
Storms pop up on Titan, 12:22
Study supersedes Jupiter's core, 3:17
Study the Seven Sisters, 12:16
Sunspot cycle delayed, not gone, 10:26
Supernova as accelerator, 10:25
Surprises from MESSENGER's historic Mercury flyby, 3:28–3:30
Survey the southern sky, 5:75
Swarm of stars, A, 4:66

T

T Leporis shows its face, 6:22
Take the Ghost Hunt challenge, 10:56–10:59
Taking a closer look at asteroids, 6:23
Telescope's 400-year revolution, The, 5:36–5:39
These galaxies don't fit the mold, 8:20
This planet should not exist, 12:21
Titan rainfall fills lakes, 6:23
Titan's bright spots point to eruptions, 4:26
Top 10 stories of 2008, 1:28–1:37
Top 10 winter Milky Way treats, 12:46–12:48
Totality over China, 11:60–11:65
25 top telescopes for starry nights, 5:68–5:73
Twisting the night away, 8:21

U

Underground ocean for Enceladus?, 10:20
Understanding the weirdest stellar explosions, 2:48–2:53

V

Vic Maris, 9:74
Volcanic sunset, A, 5:18–5:19

W

Watch as galaxies collide, 11:56–11:59
Watching echoes of a supernova, 1:26
Water flowed on Mars for longer, 1:22
What can neutrinos tell us about the universe?, 12:30–12:35
What do we really know about dark matter?, 11:28–11:33
What Europe's Moon mission revealed, 8:44–8:47
What happens when worlds collide?, 1:23
What revved up the galaxy's hyperfast stars?, 9:30–9:35
Who was the real Charles Messier?, 8:54–8:57
Why the Sun's corona is "so darned hot", 12:18
Why the universe had no beginning, 4:28–4:33
Will dark energy tear the universe apart?, 2:34–2:39
Winter Triangle, The, 2:68
Winter wreaths, 2:18–2:19
WISE up in orbit, 12:20
With HyperStar, you'll image more in less time, 4:62–4:65
Wrong place, wrong time, 6:22

X

X-ray satellite spots magnetar, 5:28

Y

Young Moon boasted strong magnetic field, 5:22
Your planets in 2009, 1:14

Z

Zoo needs you, The, 6:22

Author Index

A

Anderson, John D.
 Is there something we don't know about gravity?, 3:22–27
Andrews, Bill
 Citizen scientists help discover a new group of galaxies, 11:23
 Early black holes: smaller and hungrier, 12:19
 Gamma-ray bursts are even more mysterious, 11:25
 Paradise on Block Island, 12:23
 Storms pop up on Titan, 12:22

B

Bakich, Michael E.
 Asia's new assault on the Moon, 8:50–52
 Astronomy's 2009 Astroimaging Contest, 9:56–66
Brian Deis, 5:81
 Can we win the war against light pollution?, 2:56–59

Astronomy Magazine 2009 Index

David Nagler, 10:68
Discover the sky's deepest, darkest secrets, 6:56–59
Explore 12 great lunar targets, 10:60–63
Find your way through the spring sky, 4:54–55
Find your way through the winter sky, 1:70–71
How to build a backyard observatory, 3:56–59
How to observe comets, 12:50–53
Joseph A. Lupica, 7:64
Peter Moreo, 4:74
Russ Lederman, 6:69
Steve Cullen, 11:70
Top 10 winter Milky Way treats, 12:46–48
Vic Maris, 9:74

Berman, Bob

Alien winds, 3:12
Applying Occam's razor, 9:14
Betelgeuse: the next banana split?, 2:16
Can you imagine?, 11:16
Dozen cool facts, A, 10:16
Edges of the universe, 8:14
Facing reality, 7:14
How much solstice can you handle?, 6:13
Light fantastic, 5:16
Major mess-ups ... maybe, 4:16
Milky Way mysteries, 12:14
Your planets in 2009, 1:14

C

Chaple, Glenn

Cruise the Milky Way, 9:70
Double the observing fun, 8:15
Feast on Saturn, 3:62
Galileo's Orion, 2:66
Imperfect Moon, An, 6:14
Medicean stars, The, 11:66
Orion's StarBlast 6 makes a great first scope, 1:72–73
Phases of Venus, The, 1:78
Predicting Neptune's existence, 10:64
Re-create a Galilean scope, 5:74
Solar safety, 7:61
Study the Seven Sisters, 12:16
Swarm of stars, A, 4:66

Coe, Steve

Discover galaxy groups and clusters, 3:52–55
Explore the Great Bear's galaxies, 5:64–67

D

Davis, Thomas V.

Explore the sky's spooky reflection nebulae, 1:64–68

Dorminey, Bruce

Is our galaxy running out of gas?, 1:38–43
Stars that revealed the vastness of the universe, The, 9:48–53

E

Eicher, David J.

Crab Nebula and NGC 1023, The, 12:68
Galaxies NGC 147 and NGC 253, 11:76
Helix Nebula and Owl Cluster, The, 10:75
Hercules Cluster and M83, The, 9:79
Totality over China, 11:60–65

F

Foing, Bernard H.
What Europe's Moon mission revealed, 8:44–47
Frank, Adam
How an amateur astronomer changed stellar astrophysics, 11:48–53
How to make a solar system, 2:28–33

G

Goldstein, Alan
Explore the Gem of the Milky Way, 6:52–54
Watch as galaxies collide, 11:56–59

H

Harrington, Phil
Comb through Coma Berenices, 4:68
Explore planetary nebulae in Cygnus, 7:52–54
Follow the Charioteer, 1:80
Messier madness, 3:63
Orion's truss-tube scope offers power and portability, 8:58–59
Survey the southern sky, 5:75
25 top telescopes for starry nights, 5:68–73
Winter Triangle, The, 2:68
Hudon, Daniel
How Johannes Kepler revolutionized astronomy, 1:56–59

J

Jayawardhana, Ray
What revved up the galaxy's hyperfast stars?, 9:30–35

K

Kinoshita, Laura
Understanding the weirdest stellar explosions, 2:48–53
Kruesi, Liz
Ancient galaxies mix it up, 2:24
Asteroid buzzes Earth, 6:22
Asteroid upheaval, 11:24
Astronomers capture meager spiral, 6:16
Astronomers discover cosmic radio background, 5:27
Astronomers discover planet just twice Earth's diameter, 6:18
Astronomers find a hidden supernova, 9:20
Astronomers find first directly imaged exoplanet in old data, 8:19
Astronomers identify black hole twins, 6:20
Astronomers image springtime on Mars, 7:18
Astronomers measure giant galaxy, 10:21
Astronomers report first optical magnetar, 1:26
Astronomers use GRB to spy molecules, 5:28
Aurorae are not mirror images, 11:20
Baby stars found at galactic center, 10:22

Binary solar system in the making?, 10:25
Black hole ghost, 9:19
Black hole jets observed in new light, 8:21
Black hole radiation lights gas blobs, 10:26
Blob at the cosmic dawn, 8:22
Characterizing twin Earths won't be easy, 7:21
Colliding galaxies have shocking good time, 11:23
Cosmic weather predictor, 5:28
Dark matter provides cushion for galaxies, 7:21
Diamonds point to comet impact, 5:28
Dimmest brown dwarfs found, 4:24
Dimmest galaxy has a huge mass, 1:23
Discovery boosts Milky Way spin and mass, 4:23
Epsilon Eridani sports two asteroid belts, 2:23
Europeans propose astroparticle plan, 1:26
Fermi's high-energy eye maps the sky, 7:21
First image of planet orbiting a Sun-like star, 1:24
Four moons dance across Saturn's face, 7:19
Galactic dance may strip stars but leave dark matter, 11:24
Galaxies may have formed from primordial gas alone, 6:18
Gamma rays detected in globular cluster, 12:20
Gas cloud veils giant star pair, 2:24
Good vibrations probe stellar interiors, 2:26
Herschel opens its eye and views the Whirlpool Galaxy, 10:21
How asteroids get their color, 8:22
How we mapped the Milky Way, 10:28–33
HST back in business, 2:20
Hubble shows off spectacular stellar nursery, 1:20
Ice volcanoes on Titan?, 7:21
Indian summer on Titan, 9:18
Interstellar wind warps dust disks, 12:21
Kepler begins staring contest, 9:19
Kepler opens its eyes, 8:18
Kepler proves its precision, 12:21
Light echoes reveal Tycho's supernova, 3:16
Light's dual personality, 7:34–35
Looking for one object, astronomers discover another, 5:25
Lot more going on in Orion, A, 8:22
Mapping the Milky Way's cold dust, 11:26
Most distant star blast, 9:19
Most distant supernovae found, 11:24
Mysterious cosmic rays may originate from dark matter, 3:16
New debris found near galaxy collisions, 10:20
New evidence backs dark energy, 4:21
New method found to chart cosmic distances, 9:21
New survey reveals cosmic structure, 8:18
New UV view of M31, 12:22
New view of the Milky Way, 5:26
No gravitational waves, no problem, 12:21
Object slams into Jupiter, 11:20
Planck detectors reach their coolest, 10:25
Planet-hunting method snags its first, 9:22
Pluto's full atmosphere revealed, 6:21
Rare magnetic monster found, 10:25
Robot scopes see super-Neptune, 5:28
Scientists shed light on dark bursts, 10:24

Simulations find some early stars were twins, 11:24
Simulations hint at massive-star formation, 5:25
Sky survey finds dusty universe, 6:22
Speedy stars raise some questions, 12:21
Spirit doing science while stuck, 10:27
Spitzer sees products of planetary collision, 12:22
Stars form in Milky Way's hostile heart, 4:25
Stellar outbursts can create comet crystals, 9:19
Supernova as accelerator, 10:25
Telescope's 400-year revolution, The, 5:36–39
These galaxies don't fit the mold, 8:20
What do we really know about dark matter?, 11:28–33
Why the Sun's corona is "so darned hot", 12:18
Will dark energy tear the universe apart?, 2:34–39
Wrong place, wrong time, 6:22
X-ray satellite spots magnetar, 5:28

L

Levy, David H.

Amateur outreach, 12:56
Bard and astronomy, The, 7:60
Big brown nothing, The, 9:16
Bonanza night, A, 11:68
David Levy sky, A, 6:15
Great's life, A, 8:60
Kingston's astronomical dynamo, 10:18

M

McChain, Megan

All-inclusive expedition, An, 2:26
Beautiful science, 2:26
Extreme planet, 2:26
New mission to Mars, 1:24

N

Nadis, Steve

How we could see another universe, 6:24–29

Newton, Jack

With HyperStar, you'll image more in less time, 4:62–65

O

Oberg, James

China's next star in orbit, 1:22
GOCE satellite goes underground, The, 2:22
How we'll return to the Moon, 8:24–29
NASA seeks new space partners, 3:18

O'Brien-Trefil, Wanda

Day Earth came to life, The, 9:24–29
What can neutrinos tell us about the universe?, 12:30–35

O'Meara, Stephen James

Christmas Cross, The: a matter of life and death, 12:58–59
Extreme observing: naked-eye galaxies, 11:18–19
Fireballs from the Scorpion, 6:62–63
Fun-house porch, The, 10:66–67

Magic times on the Sun, 7:16–17
Mirror image, A, 1:16–17
Moonbows: architecture of light, 8:62–63
Readers report 2009, 9:68–69
Searching for shadow bands, 4:18–19
Serpents of the air, 3:14–15
Take the Ghost Hunt challenge, 10:56–59
Volcanic sunset, A, 5:18–19
Winter wreaths, 2:18–19

P

Pendick, Daniel

Ancient galaxies show strong magnetic hearts, 1:24
Anti-blur technology sharpens Jupiter, 1:21
Apollo sample pinpoints lunar crust's age, 6:16
Archival search spots supernova, 1:18
Astronomers capture first exoplanet images, 3:17
Astronomers CT-scan the cosmos, 5:22
Beagle2 probe may have spun too fast, 4:24
Chandra peers deep into the Tarantula's lair, 4:22
China to build giant dish, 4:24
Clues help crack chicken-and-egg galactic mystery, 5:21
Colliding clouds forge planet building blocks, 3:20
Did Phoenix spot liquid droplets on Mars?, 7:18
Dust rings point to small planets, 2:25
Exposing a crater, 3:19
Extrasolar planet tightens its waistline, 4:25
Fermi spots first gamma-only pulsar, 2:22
Fermi spots most powerful GRB ever, 6:21
Fireball flares over western Canada, 3:19
First asteroid tracked into atmosphere, 1:24
Galaxy's dark secret exposed, 1:20
High-altitude telescope tunes into star birth, 3:19
How to eyeball Ares on iTunes, 3:19
Hubble sniffs CO₂ in alien air, 3:18
IBEX is on its way, 1:24
India sends first probe to the Moon, 2:25
Invasion of the robotic telescopes, 7:28–33
Is the Big Bang in trouble?, 4:48–51
Jupiter-like worlds bulk up fast, 5:22
Keck image captures equinox on Uranus, 2:23
Long-lived star cluster harbors an aged nebula, 5:20
Massive glaciers found on Mars, 3:20
Megascopie is top pick for Europe, 3:19
MESSENGER swings by Mercury for another look, 1:22
Methane reveals Red Planet's active innards, 4:20
Milky Way's central black hole gets weighed, 4:26
NASA revs up new lunar rover, 6:20
New evidence pushes back oxygen date for Earth, 7:19
Next planetary flagship mission targets Jupiter, 7:20
Next step Mars?, 8:30–35
PanSTARRS 1 comes on line, 4:24
Rock coatings could harbor martian microbes, 4:20
Rocky strata reveal climate change on Mars, 4:21
Roving Mars lab delayed for 2 years, 4:22

Spitzer images the Omega Nebula's stormy seas, 4:23
Spitzer peeks inside comet, 2:26
Spitzer spots more ingredients of earthlike planets, 5:24
Spring brings cloudy skies to Titan, 5:20
Study supersedes Jupiter's core, 3:17
T Leporis shows its face, 6:22
Taking a closer look at asteroids, 6:23
Titan rainfall fills lakes, 6:23
Top 10 stories of 2008, 1:28–37
Watching echoes of a supernova, 1:26
Water flowed on Mars for longer, 1:22
What happens when worlds collide?, 1:23
Young Moon boasted strong magnetic field, 5:22
Zoo needs you, The, 6:22
Polakis, Tom
Adam Block's awesome universe, 6:46–51

R

Reynolds, Mike D.
DayStar's Quantum filter reveals the Sun, 3:60–61
Orion's low-cost APO delivers sharp images, 6:60–61

S

Salman, Dean
Go deep for faint nebulae with astroimager Dean Salman, 7:46–51
Schur, Chris
Chris Schur captures the universe, 4:56–61
Sheehan, William
Experience Galileo's Italy, 5:56–61
Shubinski, Raymond
All about M81 and M82, 2:60–63
Celestron revives a classic scope, 12:54–55
How the telescope remade the universe, 5:30–35
Steinhardt, Paul J.
Why the universe had no beginning, 4:28–33
Stoyan, Ronald
Who was the real Charles Messier?, 8:54–57

T

Talcott, Richard
Arches Cluster more normal than thought, 10:22
Betelgeuse blows off steam, 11:26
Bull's-eye on the Red Planet, 12:19
Cassini flies through Enceladus' geysers, 3:32–34
Comet harbors life's building block, 12:23
Comets not to blame for mass extinctions, 11:26
Dawn of a new day, 8:20
Explosion caught in the act, 10:24
Gathering storm, A, 8:22
Get ready for the great Asian eclipse, 7:56–59
Herschel and Planck on their way, 9:23
How we see the sky, 6:30–31
Hubble's grand new vistas., 12:24–29
Huge impact basin discovered on Mercury, 9:18
LRO takes first Moon images, 11:22

Astronomy Magazine 2009 Index

- Mars crater comes out of hiding, 2:27
- Mars rover spies young crater, 9:22
- MESSENGER sweeps past Mercury again, 2:20
- NASA shoots the Moon, 10:23
- Near-Earth-sized exoplanet discovered, A, 8:22
- New day dawns for Hubble, A, 9:36–39
- New planet orbits on wrong-way path, 12:18
- Ocean in Venus' past?, 11:22
- Plasma cloud tracked in 3-D, 8:19
- Saturn shows off odd aurora, 3:20
- Scoping out the great discoveries, 5:supplement
- Seeking ground truth on Mars, 10:34–39
- Shadows seen in rings, 10:25
- Spitzer: Warm is good, 11:25
- Spitzer warms up, 9:21
- Sunspot cycle delayed, not gone, 10:26
- Surprises from MESSENGER's historic Mercury flyby, 3:28–30
- This planet should not exist, 12:21
- Titan's bright spots point to eruptions, 4:26
- Twisting the night away, 8:21
- Underground ocean for Enceladus?, 10:20
- WISE up in orbit, 12:20
- Trefil, James
 - Day Earth came to life, The, 9:24–29
 - What can neutrinos tell us about the universe?, 12:30–35
- Trusock, Tom
 - iOptron's lightweight mount supports on-the-go observing, 2:64–65

V

- Villard, Ray
 - Astronomy—The next generation, 11:34–39
 - How dying stars bring new planets to life, 7:22–27
 - Is Earth one of a kind?, 4:34–39

W

- Werner, Michael
 - How the Spitzer Space Telescope unveils the unseen cosmos, 3:44–49

Y

- Yeager, Ashley
 - New technique closes in on dark energy, 6:32–35

Z

- Zimmerman, Robert
 - Epsilon Aurigae: Astronomy's longest-running mystery show, 10:48–53