

# Index

## A

Abundance, of lightest elements, 101  
Additional spatial dimensions, 151  
Alpher, R., 162  
Anthropic principle, 152–157, 194  
Anticlericalism, 70  
Aquinas, T., 4, 43, 49, 75–87  
Archaeopteryx, 41  
Archbishop of Canterbury, 46  
Aristotle, 49  
Astrology, 129  
Avicenna, 83, 85  
Axiarchism, 181, 184, 187

## B

Barnes, E.W., 36  
Barr, S., 114  
Bayes' theorem, 117–118  
Beginning of the universe, 66  
“Bianchi Type I” universe, 12–13  
Big Bang, 40, 56, 71–72, 76, 80, 82, 98, 101, 109, 147, 157, 163, 167, 194  
    cosmology, 14, 29, 79, 81, 86  
    model, 145, 154  
    theory, 1, 16, 37, 45, 61  
Black hole, 80  
Bojowald, M., 65  
Boltzmann, L., 175  
Bondi, H., 41, 42  
Brahe, T., 161  
Buckley, M., 69  
Burbidge, M., 42  
Burrell, D., 83

## C

Calabi-Yau group, 151  
Carroll, S., 187  
Cartan, E., 17  
Carter, B., 156  
Causation, 139  
Cepheid variable stars, 162  
Chomsky, N., 166  
Clarke, C.S.J., 65  
Cleaver, G., 115  
Clusters of galaxies, 108  
CMB. *See* Cosmic microwave background (CMB) radiation  
Coleman-de Lucia tunnelling, 132  
Coles, P., 169  
Collins, F., 114  
Collins, R., 115  
Comte, A., 161, 162  
Conscious experiences, 119  
Consciousness, 164, 166  
Conscious perception, 119  
Constants of physics, 113, 114, 173  
Continuous creation, 46, 52  
Cosmic horizons, 125, 130  
Cosmic microwave background (CMB) radiation, 14, 37, 98, 101, 130, 135, 136  
Cosmic rays, 3, 14, 27, 31–33, 37, 148  
*Cosmic Uroborus*, 148, 149  
Cosmological constant ( $\Lambda$ ), 13, 31, 43, 51, 98, 101, 103, 104, 106–107, 109, 127, 128, 132, 133, 145–148, 154, 186  
Cosmological parameters, 132, 154

Cosmological principle, 105–107  
 Craig, W.L., 49, 81  
 Creation, 66, 75–87, 113, 167, 195, 196  
 Curtis, H., 162

**D**

Dark energy, 101, 104, 109, 151, 176, 186, 188, 195  
 Dark matter, 102  
 Darwinian evolution, 41, 114  
 Davies, P., 49, 160  
 Dawkins, R., 142  
 Deceleration parameter  $q_0$ , 100–101  
 Dennett, D., 166  
 Density fluctuations, 151  
 Descartes, R., 29, 70  
 de Sitter model, 24  
 de Sitter universe, 10  
 de Sitter, W., 24, 28, 57, 58, 146  
 d'Espagnat, B., 166  
 Dicke, R., 37  
 Dingle, H., 28, 46  
 Dirac-Eddington equation, 17  
 Dirac, P.A.M., 34, 36, 51, 165, 187  
 Domain wall, 137  
 Dyson, F., 155

**E**

Eddington, A., 2, 10, 12, 24, 27, 28, 45, 58, 59, 98  
 Eddington-Lemaître world model, 43, 60, 147  
 Einstein, A., 57, 98, 146, 162, 187  
 Einstein-de Sitter model, 36, 37  
 Einstein universe, 26  
 Ellis, G., 49, 160, 167  
 Epstein, P., 32  
 Ertel, H., 36  
 Eternal inflation, 79  
 Everett many-worlds interpretation, 117, 126, 158  
 Expanding universe, 90, 131  
 Expansion of the early universe, 117  
 Expansion of the universe, 1, 25, 26, 34  
 Explosive universe, 34  
 Extra dimensions, 160, 163  
 Extraterrestrials, 119

**F**

Farrell, J., 52  
 Fine-structure constant  $\alpha$ , 137  
 Fine-tuning, 5, 43, 46, 48, 113, 115–118, 127–128, 132, 146, 152, 154, 157, 158, 167, 168, 173–190, 194

Fireworks universe, 1  
 First World War, 9  
 Fisher, G., 42, 46  
 Fluctuation observer, 175  
 Formation of structure, 108  
 Fowler, W., 42  
 Friedmann, A., 11, 24, 59, 146  
 Friedmann-Lemaître equations, 25, 42  
 Friedmann-Lemaître-Robertson-Walker (FLRW) models, 5, 97–99  
 Fundamental constants, 132–133, 137, 160  
 Fundamentalism, 114  
 Fundamental theory, 45

**G**

Galaxy formation, 150  
 Galileo, 70, 161, 187  
 Gamow, G., 36, 37, 50  
 Gardner, M., 160  
 General relativity, 10  
 Genesis, 86, 114, 167  
 Godart, O., 49  
 God of the gaps, 189  
 Gold, T., 42  
 Gould, S.J., 16, 194  
 Grand unified theory, 149  
 Gravitational collapse, 160  
 Gross, D., 160

**H**

Haas, A., 27  
 Hawking, S., 46, 61, 77, 81, 83, 87, 168  
 Heller, M., 49  
 Herman, R., 162  
 Higgs boson, 76  
 Hilbert, D., 56, 139  
 Holder, R., 169  
 Hoyle, F., 3, 17, 39–42, 45–47, 51, 147  
 Hubble constant, 1, 10, 25  
 Hubble, E.P., 1, 25, 90, 162  
 Hubble law, 1, 10  
 Hubble-Lemaître law, 11  
 Hubble parameter, 100, 101  
 Humason, M., 90

**I**

Infinite universe, 49, 52  
 Inflation, 108, 117, 125–126, 128, 131–132, 136, 158  
 Intelligent design, 129, 169

Isham, C., 79  
 Island universes, 162

## J

Jeans, J., 27, 28, 164  
 Jordan, P., 36

## K

Kaku, M., 76  
 Kapitza Club, 34  
 Kepler, J., 44, 187  
 KKLTL mechanism, 132  
 Kline, M., 187  
 Kraay, K., 115  
 Kragh, H., 40, 77

## L

Lais, G., 71  
 Lambert, D., 2, 76, 77  
 Large Hadron Collider, 75, 81, 160, 162  
 Leibniz, 29  
 Lemaître-Eddington model, 29, 35, 37  
 Lemaître, G.  
   appointed professor, 10  
   born, 9  
   Catholic University of Louvain, 9  
   cosmic rays, 28  
   entered the Seminary of Malines, 10  
   expanding universe, 24, 33  
   explosive universe, 23  
   faith, 16  
   fireworks model, 36  
   Francqui prize, 10  
   Friends of Jesus, 16  
   New York Times, 34  
   pedagogy of arithmetic, 15  
   pianist, 15  
   *Popular Mechanics*, 34  
   priest, 16  
   primeval atom, 28  
   returned to Belgium, 10  
   science and theology, 40  
   spinor theory, 17  
   vow of poverty, 16  
 Lemaître model, 43  
 Lemaître-Tolman-Bondi (LTB) model,  
   98, 99, 103, 108, 147–148  
 Lemaître-Vallarta theory, 32

Leslie, J., 115  
 Lessius, L., 69  
 Linde, A., 79, 166  
 Livio, M., 95, 187  
 Loop quantum cosmology, 65  
 LTB model. *See* Lemaître-Tolman-Bondi  
   (LTB) model  
 Lundmark, K., 92  
 Lyttleton, R., 41

## M

Mach's Principle, 57  
 Macrophysics, 146  
 Maddox, J., 52  
 Maffeo, S., 70  
 Majorana spinors, 17  
 Mascall, E.L., 43  
 Mather, J.C., 14  
 McCrea, W.H., 43  
 McMullin, E., 50  
 Mendel, G., 193  
 Menzel, D., 34  
 Mersenne, M., 69  
 Microphysics, 146  
 Millikan-Cameron hypothesis, 11  
 Millikan, R., 3, 11, 27, 28, 43  
 Mlodinow, L., 78  
 Motion of Mercury, 56  
 M-theory, 5, 78, 102, 117, 128, 151,  
   155, 158, 160, 161, 163  
 Multiverses, 5, 52, 81, 82, 113–122,  
   125–142, 146, 151, 157–161,  
   163, 167–169, 173–180  
 Murray Gell-Mann, 134

## N

Newton, I., 70  
 Nicholas of Cusa, 49  
 Nucleosynthesis, 48, 148, 150, 153, 154  
 Nys, D., 27

## O

Observer-selection principle, 177  
 Occam's razor, 118, 138  
 O'Connell, D., 71  
 Origin of life, 48  
 Origin of structure in the universe, 14

**P**

Pagels, H., 156  
 Panspermia, 41  
 Pascal, B., 16  
 Peacocke, A., 195  
 Peebles, J., 37  
 Penrose, R., 61, 164, 175  
 Penzias, A.A., 14  
 Perfect cosmological principle, 42–45  
 Planck density, 154  
 Planck era, 131  
 Planck time, 13  
 Plaskett, J., 36  
 Poincaré H., 11  
 Polkinghorne, J., 167, 169  
 Pontifical Academy of Sciences, 71  
 Pope Benedict XIV, 15  
 Pope John Paul II, 73  
 Pope Leo XIII, 70  
 Pope Pius XI, 15  
 Pope Pius XII, 6, 17, 50, 71–72, 76, 81, 167, 194  
 Primeval atom, 4, 12, 13, 16, 17, 23, 26, 28–31, 34, 40, 50, 56, 60, 61, 63, 64, 71–72, 98, 146  
 Primeval-atom hypothesis  
 Pythagoreans, 187

**Q**

Quantum cosmology, 63–64, 158  
 Quantum gravity, 63, 64, 79, 149, 163, 166, 168

**R**

Rees, M., 116, 127, 131  
 Robertson, H.P., 35  
 Robertson-Walker universe, 131  
 Rutherford, E., 162  
 Ryle, M., 44, 46

**S**

Sandage, A., 90  
 Sayers, D.L., 46  
 Scalar field, 131–132  
 Scalar potential, 136  
 Schwarzschild, K., 56  
 Schwarzschild singularity, 58

Schwarzschild solution, 61  
 Science and religion, 69–74, 193, 194  
 Science fiction, 142  
 Shapley, H., 162  
 Singularity, 101, 130, 158  
 Singularity theorems, 61–63  
 Slipher, V., 25, 92, 162  
 Smart, W.M., 95  
 Smolin, L., 79, 82, 140  
 Smoot, G.F., 14  
 Spirit, 164  
 Spitzer, R.J., 81  
 Steady-state theory, 4, 42–46, 49–51  
 Steady-state universe, 39  
 Steinhardt, P., 80  
 Stigler's law of eponymy, 92–93  
 Störmer problem, 14, 15  
 String theory, 78, 117, 120, 128, 129, 132, 136, 139  
 Structure formation, 134  
 Superstring theory, 151  
 Swinburne, R., 115

**T**

Taylor, R., 42  
 Taylor, H., 15  
 Teller, E., 36  
 Theism, 180, 187  
 Theism/Axiarchism, 186  
 Theodicy, 180  
 Tipler, F., 49  
 Tits, J., 17  
 Tolman-Bondi solution, 59  
 Tolman, R.C., 10, 30, 34  
 Turok, N., 80  
 Type Ia supernovae, 104

**U**

Ultimate causation, 125–142  
 Universe, age of, 27

**V**

Vatican Observatory, 70–72  
 Veneziano, G., 86  
 Vilenkin, A., 79  
 von Weizsäcker, C.F., 36

**W**

Wagoner, B., 42  
War, K., 169  
Watson, J., 165  
Weinberg, S., 187, 196  
Wheeler, J., 165  
Whittaker, E.T., 51  
Wickramasinghe, C., 41

Wilkinson Microwave Anisotropy Probe

(WMAP) satellite, 130, 136

Wilson, R.W., 14

Wormholes, 162

**Z**

Zel'dovich, Y., 37