

Science and Fiction

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Science Fiction by Scientists

An Anthology of Short Stories

 Springer

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Preface

I love science.

I love science fiction.

Since I was a kid, science and science fiction have been two sides of the same coin. At age six I was watching *Star Trek* and begging to go to the Natural History Museum and their awesome dinosaurs at every opportunity. Amazing creatures from the distant past and exotic worlds from the distant reaches of the galaxy, these were things that either science or science fiction could bring me, but nothing else could.

Science and the technology it spawns changes the world, bringing us knowledge, space, and the future itself. Well done science fiction provides a glimpse into realistic and amazing futures – or terrible futures we as a society should avoid. With the appeal of the wonders of the universe, and the bonus of foreseeing avoidable disasters, I could not stay away. I pursued my twin loves throughout my life, eventually becoming an astronomy professor who also wrote science fiction novels steeped in astrophysics.

To me, the distinguishing element of science fiction has always been and always shall be the “science” part, but there is plenty of “science fiction” on bookshelves and the movie screens that has precious little to do with science. Without the science, it’s just a western in space, or maybe a fantasy set in the future. There are audiences for those, and that’s fine. There are writers who aspire to deliver the science, but find it difficult, and that’s fine, too. Luckily I was not the first, nor the last, to become both a scientist and a science fiction writer.

Scientists can deliver on the science, and there is a history of delivery on the fiction as well. Isaac Asimov earned a PhD in chemistry before turning to writing full time and creating the three laws of robotics and the psychohistory of his Foundation trilogy. Arthur C. Clarke brought us *2001: A Space Odyssey*, and also was the first to link geostationary orbits to electronic communications. Fred Hoyle coined the term “The Big Bang Theory” (derisively, to be fair), and his thrilling speculation gave us the sentient space gas of *The Black Cloud*. Physicist Robert Forward’s brilliant imagination brought us a vision of life on the surface of a neutron star in *Dragon’s Egg*, as well as serious proposals for laser-propelled sails to voyage to other stars. Carl Sagan’s best-selling novel *Contact* about a positive SETI result also spawned a successful Hollywood blockbuster. Gregory Benford, a physics professor, won the Nebula award for his 1988 novel *Timescape* that realistically depicted not only tachyons but the academic world of science. There are many dozens of other scientists who write science fiction, coming from increasingly diverse disciplines and backgrounds, such as David Brin, Catherine Asaro, Vernor Vinge, Alastair Reynolds, and Geoffrey Landis.

This collection highlights a new generation of twenty-first century scientist science fiction writers. The majority are active research scientists, working at universities, medical schools, and space agencies, drawn to write stories on the side. Others are full-time writers who have retired from science, or, like Asimov, have set aside a career in science to write. In addition to the more traditional astronomers and physicists, the contributors include biologists, neuroscientists, computer scientists, and rocket scientists.

Given the technical expertise of these contributors, we have taken advantage of the opportunity to get them to further discuss the science in their stories in afterwords following each contribution. As one Star Trek character might opine about the far-out science explored in these pages, “fascinating.”

I still love science and science fiction as much as when I was a kid, and I hope you’ll find these tales as fascinating as I do.

Laramie, WY

Michael Brotherton

Biographical Sketches of Authors

Jed Brody teaches physics at Emory University. As a participant in the Emory-Tibet Science Initiative, he traveled to India five times to teach physics to Tibetan monks and nuns. He was a Peace Corps volunteer in Benin, West Africa. He is the author of two science-fiction novels, *The Philodendrist Heresy* and *The Entropy Heresy*. 100% of his royalties from sales of these novels are donated to charity.

Eric Choi is an aerospace engineer and award-winning writer and editor based in Toronto, Canada. He holds a bachelor's degree in engineering science and a master's degree in aerospace engineering, both from the University of Toronto, and he is an alumnus of the International Space University. Over the course of his engineering career, he has worked on a number of space projects including QEYSSat (Quantum Encryption and Science Satellite), the MET (Meteorology) payload on the Phoenix Mars Lander, the MSS (Mobile Servicing System) robotics on the International Space Station, the RADARSAT-1 Earth-observation satellite, and the MOPITT (Measurements of Pollution in the Troposphere) instrument on the Terra satellite. In 2009, he was one of the Top 40 finalists (out of 5351 applicants) in the Canadian Space Agency's astronaut recruitment campaign. He was the creator and co-editor of two speculative fiction anthologies, *Carbide Tipped Pens* (Tor) with Ben Bova and *The Dragon and the Stars* (DAW) with Derwin Mak. The first recipient of the Isaac Asimov Award (now the Dell Magazines Award) for his novelette "Dedication", he is also a two-time winner of the Prix Aurora Award – the Canadian national prize for excellence in speculative fiction – for his short story "Crimson Sky" and for co-editing *The Dragon and the Stars*. Please visit his website www.aerospacewriter.ca or follow him on Twitter@AerospaceWriter.

Andrew Fraknoi is the Chair of the Astronomy Department at Foothill College near San Francisco, and was the California Professor of the Year in 2007. With the late Byron Preiss, he co-edited *The Universe and The Planets*, two anthologies of science fact and fiction published in the 1980s. He is also the lead author on an introductory astronomy textbook, *Voyages through the Universe*, and wrote a book for children, *Disney's Wonderful World of Space*. He keeps a reading list of science fiction featuring reasonable astronomy at: www.astrosociety.org/scifi. Fraknoi was the Executive Director of the Astronomical Society of the Pacific for 14 years, and serves on the Board of the SETI Institute and on the Lick Observatory Council. Asteroid 4859 was named Asteroid Fraknoi by the International Astronomical Union in recognition of his work in public education, but he is eager to reassure readers that it is a well-behaved main-belt asteroid, and poses no danger to Earth.

Carl(ton) Frederick is a theoretical physicist, at least theoretically. After a post-doc at NASA he did a stint at Cornell University. There, he wrote a paper on Stochastic Space-time that some considered groundbreaking. Nonetheless, he became disillusioned with academia and left his first love, research on the fundamentals of quantum theory (a strange first love, perhaps) and succumbed to the enticements of hi-tech industry. He invented the, now totally obsolete, 1200 baud digital modem, and Venture Capital moved him and his company, Wolfdata, to Boston. Soon though, tired of being a lance-corporal of industry, he left his company and moved back home to become Chief Scientist of a small group doing AI software. While keeping his hand lightly in theoretical physics, he decided he'd like to write a more overt form of science fiction and, to that end, enrolled in the Odyssey Writers Workshop. He subsequently earned a first place in Writers of the Future. He now has a respectable corpus of published short-stories including 45 sales to *Analog*. He has put an interactive novel on the Web. It is interactive in that you can click to change the point of view and to expose sub-plots (www.darkzoo.net should you care to visit). He's written a half dozen or so novels and, after shopping them around faster than a speeding glacier, has turned them into Kindle e-books where they are now, along with numerous collections of his short stories, moldering in obscurity on Amazon. (You can find them by searching on Amazon for 'Frithrik', his college nickname.) He has two grown children and shares his house with a cat and a pet robot. For recreation, he fences *épée*, learns languages, and plays the bagpipes. He lives in rural, Ithaca, New York. And rural is good if you play the bagpipes. He has since returned to his aforementioned first love.

Les Johnson is a physicist and the Technical Advisor for NASA's Advanced Concepts Office at the Marshall Space Flight Center where he serves as the Principal Investigator for the NASA Near-Earth Asteroid Scout solar sail mission. Les is an author of several popular science books including *Solar Sails: A Novel Approach to Interplanetary Travel* [featured in *Nature*, April 2008] and *Harvesting Space for a Greener Earth*. He is also a science fiction writer; his books include *Going Interstellar*, *Rescue Mode*, and 2016's, *On to the Asteroid*. Les was the featured 'interstellar explorer' in the January 2013

issue of National Geographic magazine. He thrice received NASA's Exceptional Achievement Medal and has three patents. To learn more about Les, please visit his website at www.lesjohnsonauthor.com.

Edward M. Lerner has degrees in physics, computer science, and business administration. He worked in high tech and aerospace for thirty years, as everything from engineer to senior vice president, for much of that time writing science fiction as his hobby. Since 2004 he has written full-time. His novels range from near-future technothrillers, like *Small Miracles* and *Energized*, to traditional SF, like his *InterstellarNet* series, to (collaborating with Larry Niven) the space-opera epic *Fleet of Worlds* series of *Ringworld* companion novels. Lerner's most recent novel, *InterstellarNet: Enigma*, won the inaugural Canopus Award "honoring excellence in interstellar writing." His fiction has also been nominated for Locus, Prometheus, and Hugo awards. Lerner's short fiction has appeared in anthologies, collections, and many of the usual SF magazines. He also writes about science and technology, most notably in his long-running "The Science Behind the Fiction" series of essays for *Analog*.

Marissa Lingen is a science fiction writer living in the Minneapolis suburbs. She has published over one hundred short stories in venues such as *Nature*, *Analog*, *Tor.com*, *Twenty-First Century Science Fiction*, and several Year's Best anthologies. Before becoming a full-time writer, she studied physics at Gustavus Adolphus College, University of California-Davis, and Lawrence Livermore National Labs. She did research projects in interstellar spectroscopy and ceramics before settling on a nuclear physics focus to her graduate work but decided that writing was a better fit. She hikes when she can, bakes when she can't, and makes paper art inspired by neurons.

Stephanie Osborn, the *Interstellar Woman of Mystery*, is a 20+-year space program veteran, with graduate/undergraduate degrees in astronomy, physics, chemistry and mathematics, is "fluent" in several more, including geology and anatomy. She has authored, co-authored, or contributed to over 25 books, including the celebrated novel, *Burnout: The mystery of Space Shuttle STS-281*. Co-author of the *Cresperian Saga*, she currently writes the critically-acclaimed *Displaced Detective Series*, described as "Sherlock Holmes meets The X-Files," and the new *Gentleman Aegis Series*. She "pays it forward," teaching STEM through numerous media including radio, podcasting and public speaking, and working with SIGMA, the science-fiction think tank.

Jon Richards is a Senior Software Engineer at the SETI Institute concentrating on detecting SETI signals using the Allen Telescope Array. He is a computer engineer comfortable developing in many programming languages and many different types of computer systems. His past work has involved a lot of hardware design and development, tying hardware and software to networks and the internet. Since 2008 he has been trying to continually build his skills and knowledge of digital signal processing and trying to master the Allen Telescope Array hardware and software. For more information Jon and his work, see <http://www.seti.org/users/jrichards>

Tedd Roberts is the pseudonym of neuroscience researcher Robert E. Hampson, Ph.D. For more than 35 years, he has studied physiology & pharmacology, learning & memory, and brain impairment in many forms (head injury, epilepsy, abused drugs and radiation). He is involved in a research collaboration to develop a “neural prosthetic” for restoring human memory function. A keen interest in public education and brain awareness led him to join the National Academy of Science’s Science and Entertainment Exchange, provide subject matter expertise to SF/F writers and game developers, and to write science fact articles and science fiction stories of his own. With more than 150 professional research articles, he chooses to publish his nonfiction ‘Science-in-Science Fiction’ articles and SF short stories under his pen name “so that my colleagues can tell the difference!” Dr. Hampson is a medical school professor, married for over 30 years, with two grown sons. In between travel, teaching, speaking, studying martial arts and playing trombone in a Brass Octet, he makes his home in the Piedmont region of North Carolina.

Jennifer Rohn is Principal Research Associate in the Division of Medicine at University College London, United Kingdom. She has B.A. in Biology from Oberlin College, Ohio and a Ph.D. in Microbiology from the University of Washington in Seattle. She has been involved in cell, molecular and microbiological research in both academic and biotech settings in several different countries since 1989, and currently heads a research team investigating the subversive molecular behavior of the bacteria involved in chronic urinary tract infection. Jennifer also has a long-standing interest in the portrayal of scientists in fiction. She coined the term “lab lit” and founded the popular science/culture website LabLit.com to encourage more writers to use science and scientists in their everyday fiction. She has written two novels, *Experimental Heart* and *The Honest Look*, both published by Cold Spring Harbor Laboratory Press and loosely inspired by her experiences in biology laboratories over the years. Her short fiction has appeared in *Nature* and *The Human Genre Project*.

J.M. Sidorova holds a Ph.D. in molecular genetics and she is a faculty member of the University of Washington School of Medicine, where she studies DNA replication in normal and cancerous human cells. J.M.’s science fiction and fantasy short stories appeared in *Clarkesworld*, *Asimov’s*, *Abyss and Apex*, and other venues. Her debut novel *The Age of Ice* (Simon & Schuster), nine parts history, one part magic realism, was featured on *Locus Magazine’s* recommended reading list, and received an honorable mention on *Tor.com’s* best fiction of 2013 list. As a translator, she contributed to the *Red Star Tales*, an anthology of Russian science fiction (Russian Life Books, 2015). She is a graduate of the Clarion West workshop. She can be found online at www.jmsidorova.com.

Ken Wharton has been a physics professor at San Jose State University since 2001. His research is in Quantum Foundations, a field that strives for a deeper account of quantum theory and a better understanding of what quantum phenomena might be

telling us about our universe. (A general-level essay describing Dr. Wharton's overall research program can be found online under the title "The Universe is not a Computer".) His 2001 novel *Divine Intervention* (Ace) was awarded the Special Citation for the Philip K. Dick award, and he has also been a finalist for both the Nebula and the Campbell Awards.

J. Craig Wheeler is the Samuel T. and Fern Yanagisawa Regents Professor of Astronomy, Distinguished Teaching Professor at the University of Texas at Austin, and past Chair of the Department. He has published nearly 300 refereed scientific papers, as many meeting proceedings, a popular book on supernovae and gamma-ray bursts (*Cosmic Catastrophes*), two novels (*The Krone Experiment* and *Krone Ascending*), and has edited six books. He co-wrote a screenplay of *The Krone Experiment* with his son, Rob, that Rob subsequently made into an independent microbudget film. Wheeler has received many awards for his teaching, including the Regents Award, and is a popular science lecturer. He was a visiting fellow at the Joint Institute for Laboratory Astrophysics (JILA), the Japan Society for the Promotion of Science, and a Fulbright Fellow in Italy. He has served on a number of agency advisory committees, including those for the National Science Foundation, the National Aeronautics and Space Administration, and the National Research Council. He has held many positions in the American Astronomical Society and was President of the Society from 2006 to 2008. He currently serves on the AAS Ebooks committee. His research interests include supernovae, black holes and astrobiology.

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