

Preface

The notion that humanity shares the universe with other sentient beings probably predates recorded history. Since first we realized that the points of light in the night sky are other suns, we have gazed heavenward, and asked “are we alone?” In the mid-20th century, for the first time, we began to develop the technologies with which we might seek a definitive answer to this ages-old question. You hold in your hand a collection of essays by the very scientists and technologists who have led, and continue to lead, the scientific quest known as SETI, the Search for Extra-Terrestrial Intelligence.

This book is written for the educated and informed layperson, one who is technically competent though not necessarily a specialist in the varied disciplines that comprise SETI science. It should appeal to SETI technologists present and future, students of science history, space and astronomy buffs, any radio amateur who ever listened to meteor pings or microwave signals bounced off the moon, and everyone who was ever a kid peering through a backyard telescope, counting the lunar craters and the Jovian moons. It contains overviews basic enough for the technically literate general public, mathematical analyses detailed enough to challenge any academic, and a host of intellectual levels in between. We, the authors, invite you to seek your own level of comfort, and then to challenge yourself, to reach beyond it.

The 26 chapters in this book are grouped into three distinct sections, each of which could well comprise a book in its own right. Not being one to commit blatant acts of trilogy, I have combined these three books under a single cover. Here is how they break down.

The Spirit of SETI Past, written by the surviving pioneers of this emerging discipline, documents the first 50 years of SETI science. It begins with a brief overview of SETI terminology and techniques, penned by me, to bring you quickly up to speed on what is to follow. But the true story of observational SETI science starts with Frank Drake, who conducted the very first such experiment a half-century ago. Frank’s modesty prevents him from boasting about his own place in history, so that honor falls to me in Chapter 2. Chapter 3, detailing NASA’s ambitious Project Cyclops proposal, is penned by Bob Dixon of Ohio State University, one of the (sadly) few surviving members of that study team. There follows a detailed treatment of the most tantalizing

SETI candidate signal ever encountered, by the “Wow!” signal’s discoverer, Jerry Ehman. In Chapter 5 Stu Bowyer, who for decades led the various SETI efforts at the University of California, Berkeley (my alma mater), provides an overview of those early efforts. Chapter 6, dealing with a now-defunct U.S. government research project, is penned by John Billingham, who led the short-lived NASA SETI effort. In Chapter 7, Peter Backus, formerly with that same NASA project, relates how it segued into privatized research. The *SETI Past* volume concludes with a description by Harvard professor Paul Horowitz and his former graduate student, Darren Leigh, of that institution’s landmark SETI research, including the development of the world’s most powerful million (and later, billion) channel receivers.

The Spirit of SETI Present summarizes the state of the SETI art, circa 2010, and provides technical details of several contemporary SETI instruments and experiments. We begin with a description of what is currently the world’s most advanced SETI array, and the research it is presently conducting, presented by Jill Tarter of the SETI Institute, arguably the world’s best known radio astronomer and SETI scientist. In Chapter 10, photonics engineers Stuart Kingsley and Monte Ross tell about the expansion of the SETI search space into the optical spectrum. Next, we hear from the University of California’s Eric Korpela about the hugely popular SETI@home distributed SETI experiment, which has attracted millions of participants from all over this planet. In Chapter 12, I review my own current SETI project, a global network of small radio telescopes built and operated by dedicated amateurs, coordinated through the internet. There follows a chapter by Richard Factor, founder and president of the grass-roots SETI League, showing how distant massive objects can focus weak signals, for likely detection by even modest receiving stations on Earth. Mathematician Claudio Maccone then compares and contrasts the two most popular algorithms for SETI digital signal processing. In Chapter 15, engineer Stelio Mongebugnoli and his colleagues at Italy’s Istituto di Radioastronomia show how they are implementing the most computationally demanding of these algorithms at the SETI Italia facility. Next we hear from Bob Dixon again, this time in a discussion of a new radio telescope design concept that seeks to map the whole sky at once, from a single instrument. The *Present* section concludes with British scholar Stephen Webb’s contemporary treatment of perhaps the oldest question in SETI science: “Where are they?”

The Spirit of SETI Future looks forward to the next 50 years of SETI activities, extrapolating our technological prowess, and ultimately leading (dare we hope?) to that long-anticipated communication from, and perhaps even dialog with, our distant cosmic companions. In Chapter 18, we hear again from Claudio Maccone on how gravitational lensing can focus and propel the interstellar internet. Then science fiction author Stephen Baxter presents a thorough review of how SETI science is depicted in the literature,

and how those depictions will both inform and inspire future science. Next, psychologist Doug Vakoch delves into some of the deeper questions of the social consequences of communicating with the Other. This is followed in Chapter 21 by Russian radar scientist Alexander Zaitsev's treatment of the challenges of beaming deliberate messages into space. Next, physicist, science fiction author, and self-proclaimed contrarian David Brin cautions about the potential hazards associated with the transmission of messages to extraterrestrial intelligence. In Chapter 23, well-known SETI Institute spokesman Seth Shostak contemplates the longevity of extraterrestrial civilizations. British reproductive biologist Jack Cohen next takes a speculative stab at the question of ETI's physical form and characteristics. Canadian anthropologist Kathryn Denning tries to pin down just what constitutes technology, in an effort to narrow our search parameters. And finally, retired psychology professor Al Harrison wrestles with the impact which SETI success may have on human society.

In all, these three books in a single volume cover the multitude of topics which constitute SETI, perhaps the most highly interdisciplinary of scientific fields. The various chapters are written by SETI's shining stars, past, present, and future. The quest for contact is herein revealed as an exciting multigenerational journey, in which you, the reader, are invited to participate.

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