

the genre is evident from the start, where he dedicates his book to the celebrated science fiction author Poul Anderson.

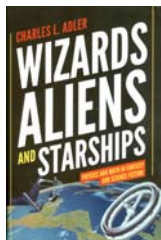
The book sets itself apart in the first few chapters with its discussion of the physics of the *Harry Potter* series. One of the first concepts he considers is the power of “disapparation,” the ability to vanish from one location and then reappear almost immediately someplace else. Adler compares that to the action of a transporter machine in the *Star Trek* series. He discusses how disapparation may violate various conservation laws. In addition, he points out, it requires the person to be killed then brought back to life elsewhere, which is “implausible.” He also considers the feasibility of that power in terms of the physics of quantum teleportation, superconductivity, and Bose–Einstein condensation.

A significant portion of *Wizards, Aliens, and Starships* is devoted to space travel and the question of whether it will be commonplace. To start the discussion, Adler reminds the reader of the many works on the theme, including the movie *2001: A Space Odyssey* and Ray Bradbury’s classic book, *The Martian Chronicles*. Adler confronts the reader with the realities of the high cost of space travel by alluding to the fundamentals of orbit mechanics and the rocket equation. In short, conventional space travel is extremely expensive—and it’s dangerous, too.

Adler also discusses how exploiting gravity slingshots or chaotic orbits can help conserve fuel during manned interplanetary space travel by conventional rockets. For the chaotic-orbits approach, he mentioned my work for Japan’s *Hiten* mission showing that harnessing chaotic orbits can save fuel, but at the cost of much slower travel.

Alternative space-travel methods are discussed, including the space elevator and exotic yet-to-be-developed propulsion systems. Adler goes even further, considering interstellar travel in the context of Albert Einstein’s theory of relativity. For a real mind bender, he even takes a look at faster-than-light travel and the weird realm of time travel, whose “grandfather paradox” has been studied by Kip Thorne and others.

The remainder of the book takes the reader on a wild ride, starting with the search for habitable planets and moving on to how we would communicate with aliens if we discovered they exist. To test the likelihood that advanced



alien civilizations are out there, Adler applies the Drake equation, based on a probabilistic argument used to estimate the number of active extraterrestrial civilizations in the Milky Way.

Adler brings some incredible concepts to life in his discussion of building artificial worlds, such as the one in Larry Niven’s classic *Ringworld*, about an enormous ring-like structure surrounding a star. Also discussed is Freeman Dyson’s “Dyson sphere,” which would surround the Sun or another star and capture energy. And Adler explores the feasibility of huge space colonies, such as those envisioned by Princeton University high-energy physicist Gerard O’Neill. The cost would be out of this world.

Accessible to anyone with knowledge of high school algebra and physics, *Wizards, Aliens, and Starships* is spellbinding and offers a totally unconventional way to study basic concepts in modern physics.

Edward Belbruno
Princeton University
Princeton, New Jersey

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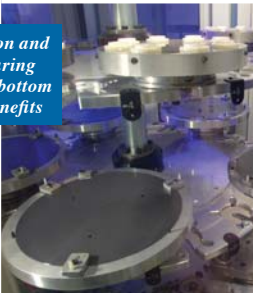
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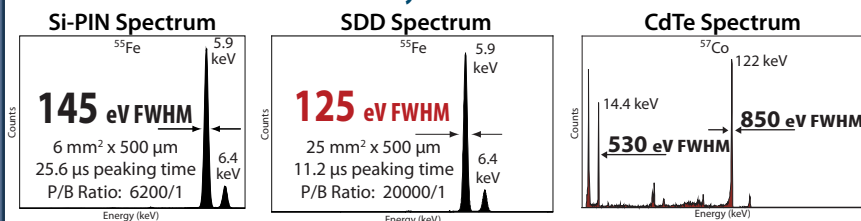


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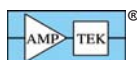
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