

reviews

Jumping into black holes

Roman Znajek

The Iron Sun: Crossing the Universe Through Black Holes. By Adrian Berry. Pp. 176. (Jonathan Cape: London, 1977.) £3.95.

ADRIAN BERRY has written a book about making black holes and jumping into them. He claims that the latter is a way of achieving instantaneous interstellar transport. After reading half the book one eventually discovers that it is called *The Iron Sun* because Berry proposes to build the holes by using magnetic fields to sweep together bits of iron (and other junk) that float around between stars. As the holes are to be ten times as massive as the Sun, and are to be situated at the 'safe' distance of one light year, this is clearly going to be a colossal task. Berry, however, thinks that humanity will continue to increase its economic output at an average annual rate of 3 per cent, and will therefore be able to achieve this feat "within about 250 years' time". Opposition is to be expected from assorted politicians, conservationists and second-rate scientists, but Berry is nevertheless confident that the project will be successfully completed by a conspiracy of dedicated technocrats.

I should explain that a black hole is a region of space where gravity is so strong that nothing, not even light, can escape. Its formation is inevitable when a sufficiently compressed piece of matter gets too cold to support itself against its own gravitational field. A ten solar mass lump of iron will certainly start to collapse under its own weight. What Berry does not seem to realise is that it will also get very hot. It is possible that the outer regions will stop collapsing and then get blown away. In other words, Berry may have created a recipe for an artificial supernova. A supernova one light year away would be a thoroughly unpleasant object and the conservationists would be justified in opposing it. There is of course no point in building the hole much further away because it is precisely in order to travel across such distances that the hole is being built in the first place.

An optimist may say that this is a mere technical difficulty and that there might be some way of cooling the matter as it collapsed. So how is a black hole going to help us get to the

stars? According to Berry, whenever a black hole is formed, a white hole 'simultaneously' appears in another part of the Universe. (A white hole is the opposite of a black hole: instead of falling into it, matter tends to fall out.) The two holes are supposed to be connected by a short piece of space that is 'outside' normal space—a kind of cosmic Suez Canal. A properly navigated spaceship can disappear into the black hole and reappear an instant later coming out of the white hole, even though a beam of light would take many years over the same journey in ordinary space.

Berry admits that many problems must be solved before such a voyage is possible. He confesses at the end of the book that no one knows where the white hole is going to appear. The fact is that no one knows *why* the white hole is going to appear. The idea that black holes are linked to white holes is a speculation which very few relativists have taken seriously. Speculation is legitimate, but quoting it as established knowledge is not. Berry has performed a grave disservice to science by not passing on warnings like: "concepts outside our present knowledge of physics must be invoked" which regu-

larly appear in the references he relies on. He owns up to the instability of the short cuts through which his spaceships travel, but does not draw the appropriate conclusion that the short cuts simply don't exist.

There are very many errors in this book. Perhaps the worst is Berry's claim that absolute time exists in the theory of special relativity. He says that although "many people who should know better" deny it, Einstein himself believed in absolute time and the simultaneity of events. This is an important issue for Berry, because if absolute time did not exist his instantaneous form of transport would lead to logical paradoxes. Unfortunately, the page to which Berry refers in Einstein's *The Meaning of Relativity* appears to be about something else, and if Berry looks at the preceding page he will no doubt decide that Einstein too needs to know better . . .

Adrian Berry should have known better than to write this book. □

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Immunopathology

Textbook of Immunopathology. Second Edition. Vol. 1: Pp. xlviii+1-554. Vol. 2: Pp. xlviii+555-1,118. Edited by P. A. Miescher and H. J. Muller-Eberhard. (Grune and Stratton: New York and London, 1976.) \$49.50; £30.20 each volume.

THIS textbook of immunological mechanisms in disease and immunopathology has become a standard work in its field of medicine. It is indispensable to those who are involved in clinical immunology or in the study of animal disease models of immunologically mediated phenomena. A consortium of expertise from both sides of the Atlantic has contributed the 63 chapters contained in this two volume work. The quality of each is uniformly high. The format of the textbook has not been altered from the first edition; obviously the editors have not wished to tamper with success. Almost 400 new pages of text, however, have been

added, thereby expanding the volume by one-third. A final chapter, an appendage, on principles of methods in immunology seems out of place in this book, and is hardly an adequate source of information on methodology for investigators in the field. It is dissonant with the highly authoritative scholarship of the preceding 62 chapters.

Almost 75 years have elapsed since Metchnikoff's publication of lectures on immunopathology. He certainly would be gratified to see how his fundamental insights into immunopathology have blossomed into a complex, vital and growing field of medicine and medical research. I think that he too would have prized this textbook.

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