BOOKS & ARTS

Physics mystery peppered with profanity

The latest thesis on the disappearance of physicist Ettore Majorana adds little, but reminds us of the Nobel-prizewinning quality of the discoveries he made during his brief career, explains **Frank Close**.

A Brilliant Darkness: The Extraordinary Life and Mysterious Disappearance of Ettore Majorana, the Troubled Genius of the Nuclear Age

by João Magueijo

Basic Books: 2009 (US); 2010 (UK).

304 pp. \$27.50, £15.99

A Brilliant Darkness tells the tale of Italian theoretical physicist Ettore Majorana, who worked with Enrico Fermi in Rome before mysteriously disappearing in 1938. In his all-too-brief career, Majorana came up with the concept of the neutron but did not publish it, regarding it as trivia. He also discovered the Majorana neutrino — a fermion that can be its own anti-particle, a concept that is currently centre-stage in particle physics owing to the recent discovery that neutrinos can have mass. It is Majorana's disappearance, however, that has excited speculation throughout the past 70 years.

Theoretical physicist João Magueijo offers a coarse version of the story. But *caveat lector*: reader beware. It is at least the eighth book on the subject — and a contender for being the worst. Magueijo revels in profanities and distasteful similes that are far too offensive to relate here. And the way in which the physics is rendered is at times shaky too. The book does mention Wolfgang Pauli's famous critique of an idea being "not even wrong"; if only that were the case here.

In popular writing, there is always tension between trying to simplify while remaining faithful to the facts. Magueijo crosses this line on more than one occasion, as with his primer on the absorption of α -, β - and γ -radiation. "Alpha radiation was the least energetic and could easily be stopped with a sheet of paper," he writes. This contrasts, he continues, with the "very energetic [β -] radiation that could be stopped only by sheets of aluminium", with γ -radiation being "by far the most powerful", stopped only by layers of lead.

This explanation is bizarre: α -particles tend to have much higher energy than β -rays, and the relative ease with which α -particles are absorbed is due to their large mass, lower speed and greater electric charge — all of which enable them to ionize atoms in material easily. Energy loss by ionization is proportional to mass and to the square of the electric charge, and inversely proportional to the energy. The 'power' of γ -rays, whatever that means, is irrelevant.

Theories about the disappearance of Ettore Majorana (far left) overshadow his contributions to physics.

The book also bandies around assertions that have to be taken on trust. Fermi, whom Magueijo describes as "intellectually *a bit limited*" (the italics are the author's), is on two occasions accused of plagiarism, about which I would have liked to have known more. First, he mentions a "clear example of scientific robbery", and then later condemns both Fermi and fellow physicist Edoardo Amaldi together of "happily publishing Ettore's 1928 work [in 1933] without even acknowledging him".

Majorana was certainly a great mind, but his oeuvre was limited: first by a refusal to publish ideas that he felt were footling, and then most dramatically by his sudden disappearance. This is usually attributed to suicide, en route by boat from Palermo to Naples. No body, passport or money have been found — although he had withdrawn half a year's salary from the bank immediately before his disappearance — leading to many conspiracy theories. Perhaps the most plausible is that he went to Buenos Aires, Argentina. A few months before his disappearance, he met Italian physicist Giuseppe Occhialini, who had just arrived from South America, and there is some circumstantial evidence that this influenced Majorana's thinking. Majorana had a postcard of the ship *Oceania*, and this very ship sailed to Argentina from Naples on the night of Majorana's disappearance. There were inconclusive sightings of Majorana in Buenos Aires into the 1950s, but frustratingly, none was followed up.

The story of Majorana's life and disappearance is told in a recent article by Barry Holstein

entitled 'The Mysterious Disappearance of Ettore Majorana' (B. R. Holstein *J. Phys. Conf. Ser.* 173, 012019; 2009), an excellent example that deals with both the disappearance and the science. Italian physicist Salvatore Esposito, whose work Holstein cites, has also investigated the mystery. His analytical examination of Majorana's disappearance, due to be published in the journal *Contemporary Physics*, shows that there are several flaws in some earlier superficial studies, and argues for the Argentinian thesis. There have also been films and documentaries, some serious, others full of conspiracy. *A Brilliant Darkness* dips into these, although often in a confusing manner — it is not always clear whether one is reading a quote or something that the author has culled from the literature or his own enquiries.

For anyone interested in Majorana's work, life and possible death, I recommend starting with Holstein, Esposito and the classic books listed within those works. *A Brilliant Darkness* adds little, and removes a lot, from the memory of Majorana and his contemporaries.

That said, there is one thing on which I agree with Magueijo: that Majorana's work has Nobel-prize quality. Nobel prizes cannot be given posthumously, but they can be given in absentia, and in his prologue the author poses the critical question: "But is Ettore dead? We simply don't know." After all, if Majorana is alive, he would only be 103.

Frank Close is professor of physics and a fellow at Exeter College, University of Oxford, Oxford, UK. e-mail: f.close1@physics.ox.ac.uk

E. RECAMI & F. MAJORANA, COURTESY AIPEMILIO SEGRE VISUAL ARCHIVES, E. RECAMI & E. MAJORANA JR COLLECTION