

Summary

Faster Than the Speed of Light: The Story of a Scientific Speculation

by João Magueijo

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John Dryden's poem "Annus Mirabilis: The Year of Wonders", 1666, celebrated the Royal Navy's victory over the Dutch and the failure of the great fire of London to consume the entire city. Yet as significant as these events are, they pale in comparison to one of the true high points of human achievement that occurred during that same year: the 24-year-old Isaac Newton laid the foundations of calculus and the theory of gravity, and outlined his theory of light. Only one other year and one other scientist bear comparison with Newton and his annus mirabilis .

Albert Einstein's "miraculous year" was 1905. The unknown 26-year-old patent clerk produced - in breathtaking succession - the special theory of relativity, the quantum theory of light and a convincing argument for the existence of atoms. As preparations for the centennial celebrations get under way, João Magueijo has written a gripping, no-holds-barred account of his challenge to one of the central tenets of relativity and its implications for our understanding of how the universe works.

That the universe began with a "big bang" is something that most of us now accept without question, yet there remain puzzling features about the universe that the big bang theory cannot explain. Why does the universe look the same over such vast distances? Why is it so large? Why does it have the shape it has? Why does the universe exist at all? For years cosmologists have been looking at the infant universe for "clues to its adult behaviour".

Some of these questions, Magueijo realised, could be answered if he broke just one golden rule. It was a simple solution to the cosmological problems, but it presented him with a problem of his own. For his answer "involved something that for a trained scientist approaches madness". What Magueijo proposed was that light travelled faster in the infant universe than it does now. In doing so, he risked "career suicide" by questioning the validity of a perhaps the most fundamental rule of modern physics: that the speed of light is a constant.

Magueijo, a reader in theoretical physics at Imperial College, London, is no madman. But some have called him a heretic and dismissed his theory. After all the constancy of the speed of light is, as he points out, "woven into the fabric of physics, into the way that the equations are written". Frankly, the reaction of his critics is understandable, since Magueijo's proposal would entail the wholesale revision of the entire framework of 20th-century physics.

Undaunted by the hostile reactions, Magueijo continued to investigate the possible consequences of a varying speed of light (VSL) in the very early universe. Whereas others may have been intimidated, he had the courage to follow where VSL led. Disappointingly, "for a long while it led nowhere".

Once he teamed up with his first collaborator on VSL, the American cosmologist Andy Albrecht, new avenues began to open up through regular brainstorming sessions. At the end of each session, conducted behind locked doors, the blackboard calculations were wiped clean. They wanted to keep their ideas under wraps until they were ready to publish a fully fledged theory, since "publish first or perish" is a sad fact of a life for all scientists.

Magueijo provides a highly readable account of the problems besetting modern cosmology and how they appear to be resolved by VSL. Better still, he gives an honest and revealing insight into what it's like to carry out scientific research: the endless frustrations, the fear of being beaten by competitors, the ebb and flow of tension between collaborators, the numerous dead ends, the unexpected moments of inspiration, and the often tedious task of checking and rechecking calculations.

Finally, Magueijo offers a glimpse into the often fraught process of peer review that begins after a finished article is submitted to a journal for publication. He and Albrecht had to bite the bullet, more than once, through a year-long review process, before their paper was finally accepted.

Magueijo finds it difficult to conceal his contempt for the reports written by referees that are at the heart of peer review. For him they are "often empty of scientific content and reflect nothing but the authors' social standing, or their good or bad relations with the referee". In fact, so scathing was he about one well-known journal that the libel lawyers were called out and the original print run of the UK edition of his book had to be shredded.

Whatever the final verdict on VSL, where experimental results will act as the ultimate referee, Magueijo and his collaborators have developed a theory that is now being taken seriously, against all the odds.

As the young Einstein once remarked: "Foolish faith in authority is the worst enemy of truth."