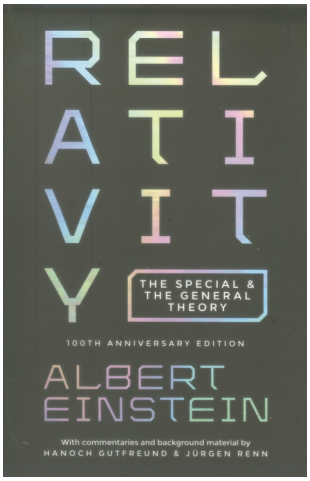

Relativity: The Special and the General Theory, 100th Anniversary Edition. Albert Einstein, with commentaries and background material by Hanoch Gutfreund and Jurgen Renn. Princeton University Press, 41 William Street, Princeton, New Jersey 08540. 2019. xxiv + 300 pages. Price: US$ 16.95.

No sooner had he submitted his final version of General Relativity, Einstein felt he should write a popular book on relativity and as quoted in the book under review wrote to Besso on 3 January 1916 'The great success in gravitation pleases me immensely. I am seriously contemplating writing a book in the near future on special and general relativity theory, although, as with all things that are not supported by a fervent wish, I am having difficulty getting started. But if I do not do so, the theory will not be understood, as simple though it basically is.' Einstein seems to be aware of the need to communicate with the general public and convince them of the inevitability of his revolutionary world view even if it contradicted their everyday experience. He seems to be far ahead of his time, in not viewing scientific progress in isolation relevant only for concerned experts but as the shared legacy of human society and its rich culture.

By December 1916 he had completed what he referred to as his `Booklet' entitled *Relativity: The Special and General Theory* which was first published in German in 1917. It was and still is a classic from the master himself. More than hundred editions have appeared in thirty languages, most after 1950. This version itself is based on the authorized English translation by Robert Lawson. It comprises Part I on special relativity (SR) (17 chapters), Part II on general relativity (GR) (12 chapters), Part III on Cosmology (3 chapters), Appendices (5) and four collector's items: An etching of Einstein, A fan letter, sample of Einstein's handwriting and a page from the original manuscript. A unique document in the history of science writing, the booklet charts the unique intellectual Odyssey from Newtonian mechanics to SR and GR skimming over the hurdles and tribulations Einstein personally overcame in its discovery. No wonder that we have this new 100th anniversary edition with new interesting commentaries and background material by Hanoch Gutfreund and Jurgen Renn comprising a Preface, Introduction, Essay on 'Einstein as a missionary for science', 'A reading companion consisting of 13 commentries' and finally 'The history and survey of foreign language editions'.

The Booklet illustrates what Einstein once said 'Everything should be made as simple as possible, but not simpler'. Without any mathematical equations, it seamlessly goes from the intuitive experience of geometry underlying our notions of space and time in classical mechanics to a questioning of it in special relativity. Starting from the velocity addition law it leads the reader to a relativity of time, simultaneity and space and then to the Lorentz transformations and its consequence for rods and clocks and a new velocity addition. It concludes with experimental consequences and the idea of Minkowski spacetime as a preparation for what is to follow. It then moves on to the general theory starting from notions of inertial mass and gravitational mass and the equivalence principle which he later called the 'happiest thought in his life'. Exploiting this equivalence he then deduces how light should behave in a gravitational field and how the gravitation field affects or `curves' space and time. Introducing geometries more general than Euclidean he motivates use of Gaussian coordinates and his view of gravity as synonymous with geometry. It essentially is the prototype of a pedagogic introduction to special and general relativity today. The third part deals with cosmological issues. The appendices are more technical. Einstein tries his best to live up to 'If you can't explain it simply, you don't understand it well enough'.

The Reading Companion by Gutfreund and Renn makes this anniversary edition special. It not only provides an insightful and organized precis of the various sections in the Booklet but also additional insights of the editors based on other external sources. It categorizes contents of the Booklet into Physics and geometry, Mechanics and space, Light propagation and time, Light propagation and space, Physics in relativistic space and time, Equivalence of mass and energy, The world of four dimensions, From special to general relativity, Gravitation and inertia, Acceleration, clocks and rods, Gravitation and geometry, Gravitation and general relativity, The challenge of cosmology, The relation of theory and experiment, The changing concept of space, Notions of space: Prescientific, Euclidean, Cartesian, Newtonian, Concept of field and its emancipation from its mechanical roots, space, time and field in special relativity, and finally Concept of space in general relativity.

The volume also contains a fascinating survey of the foreign language editions of this remarkable Booklet, their history and some interesting stories related to them. For instance, there were fourteen German editions of it between 1917 and 1922. Yet in 1947 when approached for a new German edition, Einstein rejected it saying 'After the mass-murder of my Jewish brethren by the Germans, I do not wish any of my publications to be issued in Germany'. Later in 1954 he relented and approved the new German edition. The first English translation was post the 1919 world wide media buzz triggered by the measurement by Dyson and Eddington of the bending of light by the gravitational field of the sun during the solar eclipse. The French translation was overseen by Borel and in its later edition by Einstein's close friend Maurice Solovine. In the Preface Borel wrote: '...one does not have to fear that a work signed by him, does not find readers. These readers once found will be rapidly seduced and subjugated by the subtlety, the elegance and the force of a thinking always sure of itself so that its not afraid to lower itself to become sometimes informal....'. With the Italian edition was associated Tulio Levi Civita, who suggested to Einstein that an engineer Giuseppe Luigi Calisse translate it. Levi Civita also promised to write an introduction where he said: 'The speculative importance of relativity is so enormous that in a few years more than 700 works, books, smaller publications, and articles have been dedicated to it.... but undeniably

the public strives to enter into spiritual union with the discoverer.' In a brief foreword to the Russian edition translated by Itelson, Einstein wrote 'more than ever it is necessary in our hectic times to nurture those things which can bring people of different language and nation closer to each other again'. Tragically, as the editors point out 'In 1926, the 74 old Itelson was brutally beaten on a main street in Berlin by anti-Semites screaming "beat the Jews to death".' There are similar vignettes related to Spanish, Chinese, Japanese, Polish and Hebrew editions. The Czech one was special to Einstein for he was in Prague between 1909 and 1912 when he was wrestling with the creation of General Relativity. In his foreword Einstein fondly recalls those days. One can thus see that the booklet was not a one off effort and Einstein continued to be involved in its future editions and translations adding new material and improving the presentation. In one footnote, the editors refer to the 2005 English edition of the Booklet. It has an Introduction by Roger Penrose, Commentary by Robert Geroch and historical essay by David Cassidy. Like me, I am sure you would like to lay your hands on it.

In Albert Einstein's own words regarding his Odyssey: 'The years of anxious searching in the dark, with their intense longing, their alternations of confidence and exhaustion, and final emergence into light – only those who have experienced it can understand that.' Einstein, it appears wanted to share this remarkable exhilaration with all mankind. Even after a century, GR is universally acknowledged as being the epitome of mathematical elegance, conceptual depth and remarkable observational success. Its creator Albert Einstein is as alive today as in 1919 when overnight he became an icon for intellectual heights humankind can achieve. The Booklet even today serves as a enjoyable guidebook for the uninitiated for a tour of the relativity landscape and this anniversary edition makes the trip even more exciting with its unique value additions I mentioned.

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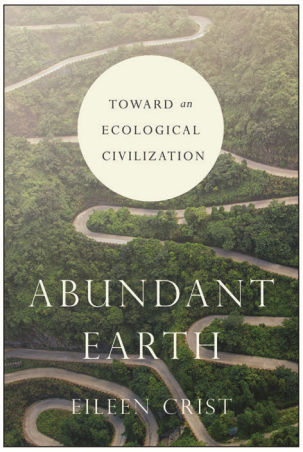

Abundant Earth: Towards an Ecological Civilization. Eileen Crist. The University of Chicago Press, 1427 E 60th St., Chicago, IL 6037. 2019. 307 pages. Price: Rs 799.

It would be hard to reconcile that the species that has all but proven its supremacy with no less than 7.8 billion humans currently dispersed across the globe and growing, has also stockpiled some 15,000 nuclear weapons enough for self-annihilation many times over its present and future numbers. Even if there are deterrents to pressing the nuclear button, the growing number of humans and their insatiable consumptive desire is sure to suck life out from all other living creatures on this planet. Shockingly, this is the new normal towards which the world is fast hurtling.

And it does not concern many that at this pace future generations are bound to inherit a different planet, perhaps inhospitable. Expanding human mobility, spreading modern conveniences, multiplying commodities glut, and enabling food choices have given unrestricted boost to the idea of human expansionism even as nature is screaming for freedom from such an onslaught. That there is a global ecological crisis of unprecedented magnitude knocking at our doors hardly registers. Instead, what often gets argued is that techno-managerial leap of progress will sail humanity through such adversities. With manmade disasters mounting by the day, how far can market-driven technologies be able to contain the collapse of its own making?

Virginia Tech professor Eileen Crist takes on this overwhelming question from all pervasive and disturbing ideas that not only human impact on nature is natural but maintaining wilderness is a defunct idea that does not augur well for human freedom and economic welfare. It is a constructed reality that harbours multitudes of challenges for human survival on this planet. Even though it is not widely acknowledged, a belief in human supremacy is anything but self-destructive. While being optimist that an ecological civilization is not an altogether utopian idea, she questions why significant steps have not been taken by humans to live in loving fellowship with our earthly wild without whom the exuberant dance of seasons, diversity, complexity and abundance will remain mere screen savers in our virtual world. *Abundant Earth* is a beautifully crafted book that not only touches upon the 'why', 'how' and 'what' of the impending ecological crises but provides 'what next' of an integral way of life to halt the inevitable.

Taking the reader beyond the oft-repeated dystopian narrative on global warming, ocean acidification, forest destruction and species extinction, the book questions the distorted mandate of the environmental movements in their failure to direct its energies toward protecting a living planet. 'No social movement agitating for liberty, equality and fraternity can succeed as long as the constitution of the biosphere as humanity's colony reigns.' Unless the environmental movement breaks free of its ideological shackles, Crist argues, it is unlikely to resist the life-destroying human-supremacist worldview. The world is fast running out of time to press for such a change – to balance human–nonhuman unequal power relations.

Enlisting direct causes and unraveling underlying drivers leading to the eco-crises at hand, *Abundant Earth* challenges the false sense of human supremacy while calling for a challenging task of scaling it down and pulling back. Despite it being politically controversial, the book strongly advocates the need for reframing the population question because 'overconsumption' and 'overpopulation' are two faces of the same coin. Given an all pervasive mainstream trend to bring the entire population at a universal consumer standard, the projected ballooning of global middle class to 5 billion by 2030, from the present 3.2 billion, will turn the earth into an unimaginable waste bin. The world can ill-afford such a transformation, which will cause an irreversible