Space and Time to Spacetime. A. R. Prasanna. Universities Press (India) Private Limited, 3-6-747/1/A and 3-6-754/1, Himayantnagar, Hyderabad 500 029. 2008. 200 pp. Price: Rs 310.

Over the last few years, several books (text or otherwise) on introductory aspects of special and general relativity have been published. So, one may ask – why another book? The answer to this question will, of course, vary from person to person. In my opinion, every book has some characteristic features which project the perspective and understanding of the author, as long as it is written with care and dedication. Therefore, having more books on a subject gives the reader an opportunity to access a wider range of topics/examples. Surely, there is a danger in this too, because it may lead to confusion, what to read first and what not to read? To avoid such a confusion, the only way is to guide the reader appropriately. This can be done by those who have been working on or learning the subject for a while. On the other hand, some authors provide guidance at the beginning, by asking the reader to follow particular tracks in the book, according to her/his level and interest. A notable early example of this method is to be found in the classic treatise, *Gravitation* by Misner, Thorne and Wheeler (W. H. Freeman, 1973).

This book is concise, useful and reasonably well written. It must be emphasized, following what the author has mentioned in the Foreword, that the book is primarily a collection of lectures. The lectures have been organized into specific chapters. The organization is traditional. However, the range of topics covered in 200 pages, seems a bit too much. The fallout of this page limitation is that there are almost no illustrative examples in the book. This is a serious deficiency and may hamper the understanding/progress of the reader. Further, the level at which the book is written varies – the first few chapters are good for even a first-year undergraduate, but the later chapters require more maturity as well as mathematical ability on the reader's part.

An interesting feature of the book, which appears throughout the text, is the attempt to provide brief glimpses of the lives and works (as well as portraits!) of the pioneers who have contributed significantly to the development of the subject. This, I believe, provides worthwhile motivation for beginners and also gives a taste of history.

The first seven chapters of the book deal with a bit of Newtonian mechanics and, mostly, special relativity. The presentation is concise with emphasis on some important points, which other authors may have missed. An example of this is the discussion on Voigt's work prior to Lorentz (pp. 45–46). A little more may have been said in the chapters on relativistic mechanics and consequences (chapters 6 and 7) – for example, a better discussion on recent experiments (e.g. on time dilation) with reference to actual numbers and orders of magnitude could have made the presentation more attractive. A notable omission is a discussion, with examples, on relativistic collisions, particularly while presenting mass–energy equivalence.

The remaining chapters (chapters 8–13) deal with general relativity, its foundations, theoretical construction and applications. In chapter 8, the author discusses the principle of equivalence, gravitational red-shift and provides a qualitative picture of the bending of light rays in a gravitational field. Chapter 9 introduces the idea of general covariance and moves on to discuss the mathematical background. As mentioned before, a lack of illustrative examples is a serious drawback here. For instance, while introducing curved space/spacetime, one usually prefers to give examples in two dimensions (prominent ones being the sphere and Rindler spacetime). Also, a good discussion on the important concept of parallel transport, with examples, is missing. Neither is there any example in the section on geodesics, nor on geodesic deviation. The Einstein field equations appear in chapter 10. Here, I find that the energy–momentum tensor is introduced rather suddenly without explaining its physical meaning. Further, the Hilbert action principle approach may have been avoided (or, at least mentioned as an advanced topic) in this book because, to the new reader this may be a bit difficult to appreciate and understand.

In the chapters/sections on applications (chapters 11–13), it is nice to see discussions on the physics of accretion and also the Hulse–Taylor binary pulsar, in the context of gravitational waves. Cosmology is dealt with briefly and I would have liked to see a bit more in terms of figures and pictures. Cosmology today is a fast-growing field and can be a strong motivating factor for youngsters who intend to pursue gravitational physics as a career option. In addition, it would have been nice if an elementary discussion on the exciting topic of gravitational lensing (perhaps with some diagrams and figures) was included just after the section on bending of light rays.

On the whole, the book, though well written, seems somewhat too ambitious. I am tempted to make a comparison of this book with the one by John B. Kogut (*Introduction to Relativity*, Academic Press, 2001), which is of similar size and content. Kogut devotes most of the book to special relativity, but also discusses general relativity in reasonable detail (about 45 pages). I guess, in the case of this book, two volumes would have been a better option. The title suggests how physical thought progressed from the notion of space and time to spacetime. Therefore, the first seven chapters with more examples and some of the additions suggested above may have been a book by itself focusing largely on special relativity. A second book (perhaps a volume II) may have dealt with curved spacetime and gravity.

Some minor comments about notation – the author seems to use both $\nabla \times$ and curl – any one could have been chosen. Further, while writing the free-space Maxwell equation, the author uses ε and μ, instead of the standard ε_0 and μ_0. Also, while stating the postulates of the special theory, it is more correct to say speed of light instead of velocity of light. There seems to be an error in eq. (6.8). There are some typographical errors which need to be corrected. The references also have some errors (e.g. citations to the work of Pound and Rebka

and Hilbert should mention the full initials of their names properly). I hope the author will make all these corrections in a future edition.

Finally, the author is quite well-known for his work (with M. A. Abramowicz) on centrifugal force reversal near a Schwarzschild black hole. I feel he could have included a qualitative discussion on this unusual effect in his book. Presumably, modesty forbade him to discuss his own work, though I strongly feel that this would surely have been an added attraction.

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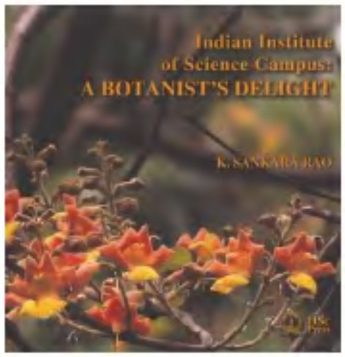

Indian Institute of Science Campus: A Botanist's Delight. K. Sankara Rao. Indian Institute of Science, Bangalore. 2008. 224 pp. Price not mentioned.

This beautiful book brought out to mark the centenary of the Indian Institute of Science (IISc), Bangalore, fully justifies the title. An area covering 320 acres of scrub land gifted by Nalvadi Krishnaraja Wodeyar, the Maharaja of Mysore in 1907, houses the prestigious 'Tata Institute' as it is familiarly known by the people of Bengaluru. Taking a walk through the avenues, side walks, woods, faculty buildings, residences, guest houses and nursery has always been a pleasant experience for me. Some tree or the other is always at bloom, but the best season to visit IISc is from February to May, when colourful blossoms of various hues – gulmohur, cassias, jacaranda, bauhinias, the yellow Carribean tree, copperpods, yellow silk cottons and coral trees fill your heart. Carpets of fallen flowers are a sight to behold. The author, K. Sankara Rao (KSR) is a Distinguished Fellow at the Centre for Ecological Sciences (CES) in IISc. He has wide interests.

KSR's introduction gives a short but vivid picture of a blend of the wild and domesticated plant diversity of the campus. He traces the history of greening of the campus, around 1930s and introduction of native and exotic perennials (*Araucaria*, *Tabebuias*, balsa, shaving brush tree, etc.) at various periods of time by the Directors of the Institute (and their spouses), horticulturists, plant lovers and members of the faculty. Over 800 species of plants are estimated to be growing in the Institute. About 285 plants are included in the book, which is user-friendly and has a map of the campus, a useful glossary of the terms and an index of plant names.

Beautiful pictures are grouped in plates. Each displays a part or the whole plant with enlargements which bring out the structure of the flowers and fruits. The common English name, the scientific name, the family to which it belongs and a brief description of the unique features are given for each plant. The flowering and fruiting seasons, the location of the plant(s) and their nativity are provided. Technical terms have been minimized to arouse interest among the beginners.

The plants displayed in the book are diverse. They comprise trees, shrubs, palms, bamboos, gigantic lianas, (specially the Callingcard Vine across CES) and slender climbers, ephemeral wild annuals, as well as beds of annual ornamental herbs, grasses, sedges, succulents, aquatic and marsh plants, orchids, flowering parasites and gymnosperms (seed plants that bear no fruits). A list of 290 plants commonly found on the campus but not included in the book is also appended for those interested in exploring the campus further. Unlike wild animals, plants are glued to the earth. Yet they present special problems to a photo artist. One rarely finds a clear foreground and an uncluttered background. Frequent visits to the perennial plants are necessary to capture the unfolding of the foliar and flower buds, open flowers and stages of fruit development. These difficulties are seldom understood by the readers. KSR is an expert photographer. This asset helps him use his mind, eye and the index finger in capturing the beauty of the whole plants. Despite the several problems, KSR has made an admirable effort in producing an aesthetically appealing and scientifically accurate work, worthy of the occasion. I would like to complement the author and his associates Suresh and Datta Raj and all those who have contributed to the compilation of this attractive volume and the Director, IISc and colleagues for their persuasion and encouragement.

This elegant book is bound to invoke nostalgia among the alumni and enthuse the present and future generations of faculty and scholars to learn more about the splendour of plant life. Centenary is an occasion to record our gratitude to the superintendents and gardeners who have tended the plants with love, year after year. A lofty tree could be named in their honour. Pragathi Press, Hyderabad deserves appreciation for the elegant production.

Several heads of scientific and educational institutions, in their enthusiasm to construct new buildings and roads, have become insensitive to the beauty, serenity and tranquility that plants provide. IISc stands out as a model for cherishing

a, *Pseudobombax ellipticum* (H.B. & K.) Dug. ***b***, *Saraca asoca* (Roxb.) de Wilde.