that the usual arguments for space settlements are good. Space settlement will be much harder than it is usually portrayed, without obvious economic benefits. Attempting space settlement now may increase the likelihood of conflict on Earth in the short term and ultimately increase human existential risk.... We believe that space settlements are possible, and perhaps one day they could be done in safety. But doing something big requires us to assess the scale of the challenge. In healthy communities of thought, the [sceptics] aren't barriers on the road to progress, but guardrails.... Going to the stars will not make us wise. We have to become wise if we want to go to the stars." — PHILLIP HELBIG.

References

(1) https://slate.com/technology/2013/04/mars-one-supporters-nobel-prize-winning-physicist-endorses-plan-to-send-people-on-a-one-way-trip.html
(2) https://www.smbc-comics.com
(3) S. Pinker, *The Better Angels of Our Nature: Why Violence Has Declined* (Viking), 2011.

A General Relativity Coursebook, by Ed Daw (Cambridge University Press), 2023. Pp. 527, 24·5 × 17 cm. Price £22·99 (paperback; ISBN 978 1 00 924244 8).

Like other books on a common topic, books on General Relativity (GR) can differ in the breadth and depth of topics covered, but also with regard to being 'maths first' or 'physics first' and which sign conventions are used. This book (neither broad nor deep, maths first, 'East Coast' sign convention (−+++, 'mostly plus')) reveals another difference: level of detail. This is an introductory book, introducing the necessary tensor calculus after an introductory chapter on the principle of equivalence before moving on to the Einstein equation and three applications (the Schwarzschild solution, Friedmann cosmological models, and gravitational waves), but differs from most other GR books in the level of mathematical detail. The mathematics is not more advanced than elsewhere, but rather spelled out, with the 'work shown'. It is thus similar to a series of lectures, and is indeed derived from lectures (so are some other books, though they have often gone through a greater transformation). Ed Daw is Professor of Particle Astrophysics at the University of Sheffield, has worked on searches for dark matter and gravitational waves, and has been lecturing on GR since 2003. The book fills the gap between more qualitative introductions to GR and books which leave out the needed details (or leave them as exercises for the reader). Although, as Daw points out, it is true that tensor calculus has many other applications as well, many interested in GR will have had no prior experience.

Daw obviously knows the material, and spends some extra time on topics which often prove difficult for many students. The book is well written and clearly structured. Chapter 8, on gravitational waves, goes a bit further afield by discussing some of the technical challenges in gravitational-wave detection. The final chapter is a guide for further reading, mentioning other books, other sign- and tensor-notation conventions, and so on. (Interestingly, Daw's favourite is Hartle's book[1,2], which is 'physics first'. I tend to prefer the 'physics first' approach, though 'maths first' is sometimes more useful for introductory books[3].) I was pleased to read of the Lorenz, rather than Lorentz, gauge (something even professionals sometimes get wrong), so put the appearance of the Lorentz gauge in Chapter 8 down to a typo. Although I often quibble about matters of style, this book is not the worst offender in that respect. There

are neither footnotes nor endnotes, and a few black-and-white diagrams are scattered throughout the text. My only real complaints are that the 'References' chapter (actually, more accurate would be 'sources' or 'further reading' since, as with many textbooks, there are few actual citations in the text) sometimes lists outdated editions of books, and that the index (fewer than three pages, though in small print) is a bit too brief (this is certainly a book in which readers will go back and look things up; a few times I couldn't find in the index what I was looking for).

This should be neither the first nor the last book one reads on GR. Less technical introductions are useful, as this book essentially assumes that its goals are clear, and those needing more details must consult more advanced texts. This book is useful in that it provides a bridge between the two, consisting of the details of tensor-calculus manipulations and 'Index Tricks of the Trade' (sect. 2.9). Especially for those who like to learn their maths as needed as they go, this is one of the few books which fit that need.* — Phillip Helbig.

References

(1) J. B. Hartle, *Gravity: An Introduction to Einstein's General Relativity* (Cambridge University Press), 2021.
(2) P. Helbig, *The Observatory*, **141**, 303, 2021.
(3) P. Helbig, *The Observatory*, **142**, 70, 2022.
(4) W. D. Heacox, *The Expanding Universe: A Primer in Relativistic Cosmology* (Cambridge University Press), 2015.
(5) P. Helbig, *The Observatory*, **136**, 204, 2016.

You Can't See in the Dark with the Lights On, by Kevin Krisciunas, with illustrations by Brian Quiroga (Innovative Ink Publishing), 2024. Pp. 30, 25 × 20 cm. Price $8·99 (paperback; ISBN 979 8 3851 1803 8).

The author and illustrator have dedicated this booklet "for everyone young and old who has wished to experience the joy of discovery." The target readership, however, seems to be children about the age of the boy who discovers the dark night sky. He looks about twelve in one drawing and eight in another. The text is entirely in verse, four to eight lines per page. Each line contains seven 'dah DUM' patterns, ending with a one-or-two syllable rhyme. The vocabulary extends to words like 'hemispherical' and 'planetarium' which might (or might not) need translation for younger readers.

The author provides an interesting comparison of distances: the size of a baseball diamond (Yankee Stadium) to an astronomical unit is very nearly equal to the ratio of the distance New York to Timbuktu to the distance from the Solar System to Proxima Centauri. A target reader will not, of course, need to use this to figure out the size of a baseball stadium as I did!

The main message is that very dark sites are wonderful and should be preserved, and author and illustrator drop quite a few factoids about stars, the Solar System, and the Milky Way in making their main point. My only serious quarrel is with the statement that "every star there ever was is in a constellation." I know where CM Tauri is today and roughly where it was a millennium ago, but its location as a newly formed main-sequence star of 8–10 solar masses occurred something like 10 million years ago, when the only patterns we would still recognize were the globular clusters and a few of the older open ones like M67, the Hyades, and Pleiades. Many stars that are still around today are a few billion years old, and have been around the Milky Way many times, with (I suspect) no constellation-naming species to locate them.

*Another[4] reviewed in these pages[5] covers similar ground, but only with respect to cosmology.