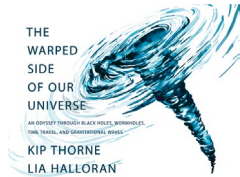


Still life of a warped Universe

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The Warped Side of Our Universe: An Odyssey through Black Holes, Wormholes, Time Travel, and Gravitational Waves

By Kip Thorne and Lia Halloran
 Livright: 2023.
 240pp. \$50

What is the link between a theoretical physicist, an artist, her wife, the Canadian poet Robert Service, black holes and *Playboy* magazine? With the catchy and all-encompassing subtitle, “An odyssey through black holes, wormholes, time travel, and gravitational waves”, the book *The Warped Side of Our Universe* by theoretical physicist and Nobel laureate Kip Thorne and artist Lia Halloran promises to describe some prosaic and some more fantastical ways that gravitational waves can teach us something about the Universe we live in and its underlying physical laws.

The premise is laid out clearly in the first sentence of its preface: “This book embodies, through poetry and paintings, the ethos of a wild and unfamiliar side of our Universe: objects and phenomena made from warped spacetime.” And if that sounds intriguing, the story behind its creation is even more fascinating. The original intention was for a shorter version of this work to be published in the entertainment magazine *Playboy*!

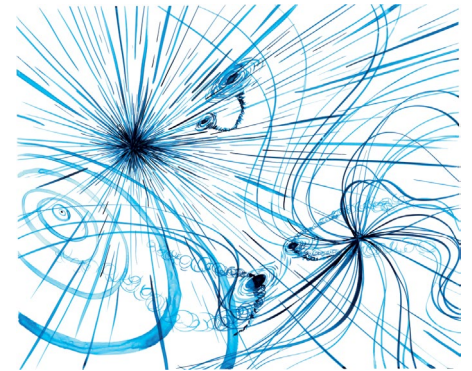
That article was meant to combine Halloran’s paintings of the warped Universe; artistic translations of Kip’s complex theoretical work, with pared down explanations of these theories written in verse by Thorne. In the preface we learn about Thorne’s childhood fascination with the poetic work *The Cremation of Sam McGee* by Robert Service (‘the Bard of the Yukon’), which explains the ambitious venture of writing about black holes, wormholes and warped spacetime in four-beat and three-beat lines. A question though remains: why *Playboy*?

As it turns out, the 2010s marked a period of introspection and rebranding for *Playboy*

magazine. During that time, Amy Grace Loyd, *Playboy*’s literary editor, commissioned a series of high-quality literature and art pieces to be included in its pages. While Amy and her art editor were both enthusiastic about the concept of the article, the endeavour stumbled upon none other than Hugh Hefner. Halloran’s paintings included depictions of her wife, Felicia, being sucked into a black hole, and apart from being a rather unconventional choice of imagery, it turned out that Felicia’s depiction did not fit Hefner’s ‘feminine ideal’. Despite this rejection, Thorne and Halloran continued working together and expanding on the original idea, leading to this book.

The book is divided into five major chapters. The first three describe objects and phenomena characterized by significantly warped spacetime: black holes, wormholes and geometrodynamics and gravitational waves. The third chapter, the longest in the book, covers the grounding premise of the work, namely the ideation and building of the LIGO detectors, the first detections of gravitational waves and the discovery of mergers of neutron stars and black holes. The last two chapters then go on to explore the immediate and more long-term impact of these detections, from understanding the physics of black holes and neutron stars, to uncovering hints about the Big Bang and the principles of quantum gravity and cosmic strings. Conspicuous in its absence (a single mention is relegated to one of the final footnotes of the book’s epilogue) is a discussion of pulsar timing arrays, a complementary way of looking for the longest wavelength gravitational waves from the merger of supermassive black holes and the primordial Universe. The omission seems all the more stark given a section on other, future gravitational wave experiments on Earth or around it.

Thorne’s writing in economical verse results in a sparse text that allows Halloran’s paintings to take centre stage, visualizing otherwise rather abstract concepts. The language is accessible and largely devoid of jargon, meaning that a scientific background is mostly unnecessary to read this book. Indeed, lay metaphors and parallels are used liberally in Kip’s prose along with references to the movie *Interstellar*. Yet, when it comes to the more abstract and exotic phenomena described in the book, I wonder whether the general public



would be able to follow or understand the relevance of what is being discussed. Perhaps this slight confusion of intended target audience reflects the original commissioning of the work for *Playboy* and the subsequent reworking to a stand-alone book.

It is therefore fortunate that the author chose to include an explainer at the end of the book. A “Foundations” chapter revisits each vignette in the book and provides an explainer and more context. Equally useful, the “Foundations” are followed by a “Chronology” that lays out a timeline from the Big Bang, all the way to the conclusion of LIGO’s third observational campaign in March 2020. While it might have compromised the creators’ artistic vision, having this information interspersed with the poems and paintings of the main part of the book would have perhaps made for a more rewarding reading experience for the uninitiated.

Halloran’s art is the main star of the book. With more than 300 paintings, the body of work tackles the very difficult task of making the abstract and intangible into something visually accessible and engaging. Paintings range from the very conceptual (quantum gravity) to the very concrete (a depiction of the Nobel medal). Warped spacetime, depicted as twisted vortices, and gravitational waves, shown as propagating ripples, are of course staples throughout the majority of the paintings. The multiple depictions of Halloran’s ill-fated wife being torn apart by black holes is a questionable choice, especially because mid-way through the book the author and artist drop this theme. Perhaps they realize the difficulty of describing the interaction of Felicia’s material body with increasingly more

exotic theoretical constructs, or just take pity on the poor woman. Nevertheless, Felicia's presence resonates throughout the book and is a wonderful acknowledgement of the artist's LGBTQ+ identity.

All in all, this book is an exquisite treat for anyone interested in taking a peek inside the mind of one of the fathers of gravitational

wave physics and seeing black holes and other wonderful fabrications of gravity under a completely different, artistic light. It is a fascinating journey that succeeds in conveying the wonder of the Universe, the thrill of the discovery of the first gravitational waves, the satisfaction of vindication for a bet taken decades ago to build LIGO and the delight of

opening up a completely new observational window to the Universe.

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