

The Science of Interstellar. Kip Thorne. W.W. Norton & Company, Inc., 500 Fifth Avenue, New York. 2014. 336 pages. Price: US\$ 24.95.

Interstellar stands, as one of those rare examples, where you feel bereft of your body as the mind gets consumed by the powerful visuals. It is one of those rare cases when one starts to feel the entirety of one's conscious, going through the painstaking yet oddly satisfying process of indexing the film almost frame by frame.

A science fiction film of epic proportions, *Interstellar*, challenged the intellectual credibility of its audience, especially the sci-fi movie buffs. The plot pivots precariously on the primal human instinct to survive and what follows is the journey of a handful of protagonists leading an exodus to the far reaches of our Universe, in the search of a new home, a new planet to thrive on, when Earth begins to gradually dust away an entire species.

But how does the plot differ from the bulk of science fiction films that we have already come across in our time? Was it the brutally detailed visual effects clubbed with invigorating music score or was it the Academy Award adorned star cast and the grace they brought on screen, that has collectively come to re-define the cinematic experience unto a degree where the global film-watching population has become divided into those who have watched *Interstellar* and those who are going to re-watch it?

Well, the answer is neither. The heart of once-in-a-generation masterpiece such as *Interstellar* lies in the authenticity of the true science behind fiction, and the possibility that after all, this might not be

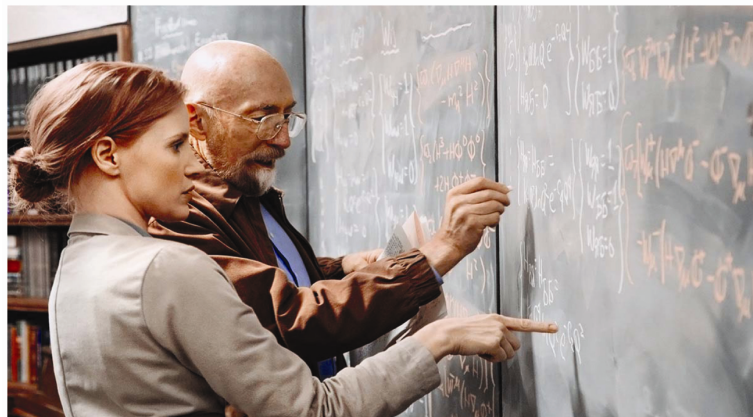
categorized as a fiction entirely, but as a foresight, a foray into the real science and an opportunity to learn and evolve further as beings of higher intelligence.

Interstellar represents the perfect union of a theoretical physics paper written

by the most authoritative individual on the subject and the vision of one of the greatest film director our generation has seen. Not only was *Interstellar* able to satiate my voracious intellectual hunger but also injected within a torrent of addictive



Kip Thorne helped the visual effects team at Double Negative create scientifically accurate designs of the cosmos and its various modules as seen in the film. Like that of the Gargantua (a massive black hole) and the topography of the planets orbiting it (above).



Actress Jessica Chastain consulting Scientific Advisor Kip Thorne in trying to sort actual physics and mathematical equations on the sets of *Interstellar*.



Executive Producer Kip Thorne and Director Christopher Nolan talking on the set in the *Endurance's* command module.

urge to delve deeper into the subject. The simple monosyllabic question of ‘how’ was resonating in my mind constantly, prodding my conscious to exalt the perceptive boundaries of my knowledge and imagination.

Warped time, singularities, fifth dimension, relativity and gravitational anomalies, what do they mean? How real are they? It was the science behind, the reasoning and deduction showcased in the film that instantly acted upon my curiosity and inspired me to peek behind the curtain. If some movies present food for thought, *Interstellar* provided me with a buffet for the same. But it would not have been easier to ingest and comprehend all that information had it not been for Kip Thorne and his newly authored: *The Science of Interstellar*.

World renowned Feynman Professor of Theoretical Physics, who was also the scientific advisor and executive producer of *Interstellar*, Kip Thorne has not acted as science police and enforced upon his theories and equations, but as a patient narrator, as an understanding guide, takes us by the route of least discomfort on our way to reach the destination. Using the film as the foundation stone, Thorne enables the reader to un-weave the complex fabric of science and universe, thread by thread in his relentless drive to make science accessible to those of us who do not possess a massive intellect or an immense body of knowledge. Without using the complex scientific equations that only a physicist can decipher, he narrates the significance of the science in the film and answer the ‘how’ in the most articulate and informative manner.

Kip Thorne’s *The Science of Interstellar*, helps answer many questions that the film raises, enriching the visuals. It helps to imagine the higher dimensions while trapped in a three-dimensional world, to unlearn much of what one has grown up learning and to contemplate the weight and significance of those written words that inspires one’s intellect to go further afield into unexplored territories, tapering towards a personal Eureka moment!

The humble brilliance of Thorne’s agile mind is showcased in how well he recognizes the disability of a reader with a comparably trivial knowledge of science. Admittedly, some portions of this book may be rough going, but that is the nature of real science and it will require thought, sometimes deep thought and

other times hours of sleep as you lay wondering in the dead of the night about the enormity of space-time and feel humbled by the universe and its mystique. However, Thorne provides the freedom to the readers with a science-phobia to skip such parts without decaying essence of the book. Yet for the curious book-worms, he provides enough to help stretch those brain cells after a day’s read.

But what really strikes is the reasoning, the hours of debating and the weeks of efforts it took for Thorne and his team to make every single thought or detail in the plot of the film have a solid scientific foundation. As the book also documents the entire behind the scene brainstorming sessions, it is remarkable to discover that director Christopher Nolan and Thorne never left any loose end that would pull down the credibility of the science in the film. Instead if the background science were not concrete enough in a scene, they would simply cut it off than resort to rote copying or guess work. From why only a sandstorm could threaten human life on Earth to the reason behind the visual appearance of a black hole, to the cause of the 4000 feet high tidal wave, every minute detail was iron clad in solid scientific facts and reasoning. As Thorne explains in the book, *Interstellar* and its visual effects are not only beautiful to look at but are the most apt visual representation of the equations a theoretical physicist has to grapple with on a daily basis.

This remarkable leap from ‘fantasy science fiction’ to a ‘justified science fiction’ is what sets *Interstellar* miles ahead of its nearest rival. It is as if one day human race evolves to undertake interstellar space travel, then the black holes, the wormholes, alien planets and the entire cosmos most likely, would appear to be an actual rendition of the film itself and its sound scientific explanation expanded in the book.

While the general readership is not wholly biased towards reading hard-core science literature (except for probably *The Brief History of Time* by Stephen Hawking), *The Science of Interstellar* takes on some of the most gruelling theories which are at or just beyond the frontier of human understanding in today’s world. Yet, Thorne still manages to keep its content relevant and engaging to the general readership with the inclusion of references and screenshots from the film, plus the supportive visuals and engaging

diagrams that were specially fabricated for the book by Double Negative team (who also provided the visual effects for *Interstellar*).

Thorne’s book allows the readers to skirt the edge of the metaphorical black hole much like the Endurance did with the Gargantua, keeping the readers in a comfortably contemporary orbit without the hampering inconvenience of sucking them into the incoherent world of physical equations and theories. However, I would not want to be the one to scratch my way away when there was an infinite vista of knowledge between Thorne’s written words, which were constantly tickling my curiosity. So not unlike Cooper, I knowingly plunged headlong into the black hole. And just like Cooper had TARS for help down there, I had Kip Thorne for guidance towards my emergence into enlightenment.

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Tectonic Inheritance in Continental Rifts and Passive Margins. Achyuta Ayan Misra and Soumyajit Mukherjee. Springer Cham Heidelberg New York Dordrecht London. 2015. pp. 88. ISBN 978-3-319-20576-2. E-book available. Price: € 49.99 (softcover).

The main purpose of this book is to provide a clear understanding on the control of pre-existing tectonic weaknesses on the evolution of rift zones and passive margins. The authors have explained the relationship between the pre-existing structural elements and rifting architecture, and in attempting to do so, they have succeeded in connecting with readers. This work is a good summary of the available information from previously published books and research papers, and credit goes to the authors for presenting the assimilated information in a single volume.

The contents of the book are divided into seven chapters. Chapter 1 deals with the general concepts of rift and passive margin formation in relation to tectonic inheritance. Though the authors have mentioned various parameters controlling