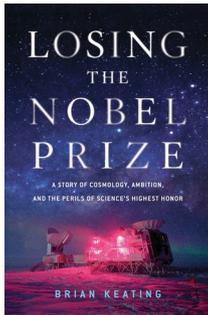


The seduction of a scientist



Losing the Nobel Prize: A Story of Cosmology, Ambition, and the Perils of Science's Highest Honor

by Brian Keating

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320 pp. US\$27.95

Scientists are rational, until they are human. Susceptible to greed, prejudice and seduction, they are not immune to cognitive pitfalls like the groupthink that led John F. Kennedy's advisors to recommend the invasion of the Bay of Pigs. Searching for a Bay of Pigs moment in science, BICEP2's premature announcement in 2014 of the detection of primordial gravitational waves is a high contender. Although the results had yet to undergo peer review, the collaboration's leading scientists were immediately hailed as the next Nobel Prize winners. However, only a few months later, serious doubts were cast over the claim, leading to the realization that galactic dust had caused the signal. In *Losing the Nobel Prize*, astrophysicist Brian Keating, leader of the predecessor collaboration BICEP and founding member of its upgraded version BICEP2, explains how groupthink and the seductive power of the fame and fortunes that come with receiving a golden medal featuring Alfred Nobel's likeness are to blame.

The acronym BICEP stands for Background Imaging of Cosmic Extragalactic Polarization. Keating asserts how he, along with Jamie Bock of NASA's Jet Propulsion Laboratory, were the first to pitch the idea of using a modestly sized refractive telescope to measure curls and swirls in the cosmic microwave background. These swirls, also called B-modes, result from the shear and stretching left by gravitational waves generated by cosmic inflation, the leading theory of how quantum fluctuations caused the Universe to grow into the flat, isotropic, expanding space that it is today. The observation of B-modes in the cosmic microwave background would confirm the theory of cosmic inflation, clarifying how our Universe began and how it will end.

A good third of Keating's book is dedicated to the history of this theory, forming a delightful account of how the 'great debates' about whether humans are privileged observers of the Universe — the Copernican principle and its modern incarnations — have been shaping astrophysics from Galileo until today. The narrative is infused with a reflection on credit attribution in science: who won Nobel Prizes for their contributions to these debates — and who could have but didn't? Most notably, Bell Labs engineer Edward Ohm worked on the same six-metre radio telescope that helped Arno Penzias and Robert Arno Wilson make their serendipitous discovery of the cosmic microwave background. Ohm, however, did not put himself through the painstaking hunt for systematic errors that, eventually leading them to rule out all other explanations, won Penzias and Wilson the Nobel Prize. Keating also explains how galactic dust has led many astronomers astray, resulting, for example, in William Herschel's erroneous conclusion that our Solar System is located in the centre of the Milky Way and in Edwin Hubble's huge underestimation of the Universe's age.

The second part of the book tells the tale of the BICEP2 disaster from Keating's point of view. The account seems like a therapeutic device to help him deal with the raw emotions he felt living through BICEP2's Icarian rise and fall. After all, the observation of B-modes was supposed to be Keating's Nobel-worthy contribution to the great debates. Being aware of the dangers of confirmation bias and dust, he and the other men (yes, there were only men) in BICEP2's leadership group considered themselves invincible. Competition was fierce and elbows were sharp. Conflicts escalated just before the announcement: Keating was forced out of the leading circle and reduced to a footnote in the infamous press conference. After all, the Nobel Prize can only be awarded to three researchers each year — who from BICEP2 would get lucky?

When BICEP2 saw B-modes they were so pronounced that the researchers couldn't believe their eyes. But ruling out that this observation was not due to dust proved near impossible without the help of unreleased data from their competitor, the European Space Agency's Planck space observatory. In an impressive case study of how groupthink

can result in unethical and sloppy behaviour, Keating describes how a photograph of a slide from Planck that depicted a map of the dust was used as a major link in their line of arguments. BICEP2 wasn't authorized to use that data but they did anyway, to "beat them all to it" and win the Nobel Prize. We all know what followed.

Groupthink is hypothesized to be less likely if a diverse group of people is involved in governance. What if BICEP2 had had a more diverse leadership group? Would they have acted more carefully? Although Keating does not pose this specific question, he discusses the lack of diversity of physics Nobel laureates, with only two female awardees in its long history, Marie Curie and Maria Goeppert-Mayer. This issue, along with other criticism of the Nobel Prize and a call to reform it, forms the last and weakest part of Keating's book. Most of his points have been made elsewhere — for example, that collaborations should be eligible and that it should be awarded posthumously. His most original proposal is to award the Nobel Prize primarily to serendipitous discoveries — but that would essentially rule out theorists.

Whether any of Keating's reform proposals could help to improve science is questionable to say the least. The Nobel Prize may play a role as an incentive for the top 1% of scientists, but the remaining 99% deal with the realities of getting tenure and funding in view of a distorted assessment system — not to mention making family life possible. For women and minorities, we can throw harassment and discrimination into the mix.

Using a quote attributed to Mark Twain, Keating warns "History does not repeat itself, but it rhymes". For homogeneous groups of ambitious researchers who see the mirage of a Nobel Prize dangling within reach, the most valuable advice from the BICEP2 story is this: get a diverse team together and get your feet back on the ground.

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