

LETTERS

Perfection from a simpler time

The feature article "A perfect proposal" by Daniel Kleppner and Paul Horowitz (PHYSICS TODAY, January 2016, page 48) is enough to make a scientist cry. An entire field of science proposed in 800 words with a six-line equipment budget.

I suspect that proposal would not fare well today. It included no salary or fringe-benefits budget, no tuition budget, and no indirect cost recovery. No environmental impact statement was prepared, even though the antenna surely changed the aesthetics of the lab building, and it wasn't vetted by a grounds committee.

No bibliography was offered, no curriculum vitae were attached, and no figures were enclosed. The submission did not contain a "broader impacts" statement; since the impact was obvious to author and reviewer, why waste words?

The proposal included no mention of outreach or demographics. It gave deference to individual competitors rather than assembling a multi-investigator, cross-disciplinary team or demeaning the work of others. And the submitter had a reasonable expectation of a two-month review cycle and a high probability of funding.

Perhaps that's the point of the article: Much that attracted prior generations to science is now unfundable! If we came up with a proposal to fix what is so obviously broken with the grant and funding system, to whom would we send it?

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Thoughts on Einstein and general relativity

Recently I read that scientists have compared the vibrational frequency of a chemical bond of methane in a distant galaxy with that of methane here

on Earth, and they now know that in the past 7 billion years, a particular nuclear force has remained unchanged to within at least 1 part in 10 billion. That experimental result failed to ease my mind regarding the world's stability, but it does illustrate the deep understanding we now have of our universe. Einstein's theory—surely one of humanity's grandest intellectual achievements—did open up new vistas that revealed the origin and evolution of our universe.

Just over 100 years ago, Albert Einstein published his general theory of relativity—10 years after his *annus mirabilis* when he, arguably, laid the foundations of quantum physics. In its broadest terms, the theory established the intimate connection between space, time, and matter. That inseparable relationship had no practical consequences under normal conditions, and Newton's well-established laws of motion needed to be modified only under very extreme ones—say, at speeds approaching the speed of light. So Einstein was astonished by the enormous fuss four years later, when an astronomical observation—the deflection of light by the Sun's gravity—confirmed his theory.

Einstein maintained that unlike Copernicus's theory, which demoted our planet from its central role in the solar system, his theory did not affect anyone's philosophy or worldview. Indeed, in 1915, when his eight-page paper "On the general theory of relativity" appeared in the *Proceedings of the Royal Prussian Academy of Sciences*, few people paid attention to it, and among physicists, there were more than a few skeptics.

Surprisingly for that time, Einstein presented his new theory to the general public even before it was quite finished, first in a newspaper article and soon after that in a popular lecture in Berlin's Trepow Observatory in June 1915. In fact, he gave nonspecialist lectures on relativity on many other occasions and also wrote a hugely successful book about it. Explaining your work to lay audiences is an excellent way to clarify your own ideas, but Einstein also saw it as a scientist's responsibility to society.¹

That paper was one of seven articles he published in 1915. Another was entitled "My opinion on the war," in which he defended his pacifist position even as nationalistic fervor swept Germany. That Einstein was able to complete his theory

under the prevailing circumstances is evidence of his extraordinary power of concentration.

World War I was in its second year, Berlin was experiencing a severe food shortage, and Einstein's personal life was in a shambles. His marriage to Mileva Marić had broken up the year before, and she had returned to Zürich with their two sons. Since then Einstein had been engaged in a bitter exchange of letters with her, even while he anxiously tried to retain a close relationship with his sons, who were 5 and 11 at the time. He had moved to an apartment not far from that of his cousin and good friend Elsa Löwenthal. A divorce agreement with Mileva became official in February 1919, and he married Elsa in June.

In November of that year, at a well-publicized meeting of the Royal Society in London, Arthur Eddington announced that his astronomical expeditions had measured the deflection of starlight by the Sun's gravitational field and that the result confirmed the general theory of relativity. Einstein became a worldwide celebrity overnight, and his life was changed irrevocably.

Reference

1. J. Eisinger, *Einstein at Home*, Prometheus Books (2016); *Einstein on the Road*, Prometheus Books (2011).

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Harassment in our community: An open letter

Dear senior astrophysicists, physicists, and planetary scientists, including observatory directors, project leaders, program administrators, and department chairs:

In recent months a litany of harassment cases in our community have come to light. In all of those cases, senior members of the community were documented to have caused extensive and direct harm to some of our most vulnerable members. Troublingly, the public cases are only a small fraction of those that currently afflict our community; for every