# PRINCETON UNIVERSITY
# PRINCETON FUNDS FOR BASIC SCIENTIFIC RESEARCH

Princeton has long been known for outstanding contributions to basic science, with Nobel Prizes celebrating the work of Joseph Taylor, Val Fitch and Daniel Tsui in physics, Eric Wieschaus in molecular biology, and John Nash in game theory. Princeton's mathematicians also have been recognized with that field's highest honors, the Fields Medal and the Wolf Prize.

At Princeton, the University's smaller scale, multi-disciplinary investigative culture and supportive environment help our scientists—faculty, undergraduates, post-doctoral fellows, and graduate students—lead the global dialogue. From Princeton's astrophysicists exploring the speed at which the universe expands to a chemist investigating the pigment in butterfly wings, basic science at Princeton propels our understanding of the world around us.

It is an axiom that many scientific breakthroughs arise during the pursuit of "radical" hypotheses: perhaps strings can represent the elementary particles observed in particle accelerators or perhaps we can grow new brain cells in adulthood. Though not anticipated at the beginning of the investigation, a new drug to fight lung cancer was developed from what was learned from studying the colors found in butterfly wings.

With numerous and relentless pressures on their budgets, universities must make difficult choices. Innovative, off-beat research— where scientists have resources to explore hunches—can seem like a luxury. However, if we as a society do not encourage and support this risky research, we stand to lose an incalculable treasure: we will miss out on the fundamental discoveries that will illuminate paths to solve pressing global problems.

At the same time, the worrisome decline of government support for basic scientific research makes it especially challenging to sustain established research projects, even those with the highest quality and exceptional track records, at the level needed to succeed. Allowing this trend to continue places at risk some of the best work by top mid-career or senior star researchers, often involving collaborations that have taken years to establish.

Last, but by no means least, the health of the scientific research enterprise, that is to say the ability to make major advances whose goal is to *understand* the world, rests on universities' ability to *attract* a steady stream of exceptional early-career researchers so that they can start stellar careers that may one day lead to a radical change in our perception of the world.

In order to ensure that basic scientific inquiry is nurtured and sustained at Princeton, the University will create three new funds for scientific research in the life sciences, physical sciences, engineering, and applied and pure mathematics.

One fund, the Scientific Innovator Fund, will focus on original research projects with a preference for early-career faculty Focusing on a carefully selected group of exceptionally promising early-career faculty scientists, this funding would allow these rising stars to explore unconventional and untested ideas before these can form the basis of grants from traditional funding sources. Without the complex application and reporting requirements of typical grants,

grantees would be able to devote more time to science and less to securing and accounting for funding. Examples of groundbreaking scientific research produced by early-career Princeton scientists include a “no frills” quantum computer, a nanolab that can explore the inner workings of a living cell non-destructively, and the visualization of new quantum states of matter.

The Scientific Innovator Fund will call for proposals with a preference for early-career faculty scientists. The Fund will use as administrative models other successful innovation funds at the University. An anonymous group of peers, under the aegis of the dean for research and complemented by external experts as needed, will review the proposals for overall quality and innovativeness of the research proposed Also considered will be the research’s significance and likely impact on the field. Grants may be given for single or multiple years.

We already know that this kind of fund sparks innovative science at Princeton. We have established such a fund for transformative technologies and another one for exploratory ideas in engineering, and the proposals worthy of support far outstrip Princeton’s ability to underwrite them (typically Princeton funds 1 in 10 transformative technology proposals). This fund, distinctive because of its focus on basic science, will complement and extend the existing support and ensure that the pursuit of scientific knowledge for its own sake flourishes at Princeton.

A second fund, the Exceptional Accomplishment Fund, would provide accomplishment-based support for exceptional established scientists. The current funding environment puts at risk investigators’ sustained focus on a promising hypothesis. Scientists’ grant renewals are being reduced for current projects, undercutting their ability, for example, to retain graduate students and post-doctoral researchers. The work of these graduate students and post-doctoral researchers is essential both to completing the project and to training the new scientists who will move the field forward. Also threatened in this environment are funds to purchase new equipment, computing resources, and other critical components of investigation. This fund would be awarded to the very best among more senior researchers whose proposals would be judged by a committee of peers. In this case, proposals would be judged on the basis of exceptional accomplishment and ability to contribute to fundamental scientific understanding.

The third fund, the New Scientific Talent Fund, would provide start-up funding for the most promising assistant professors planning to start a career in basic science. Selected by a faculty committee from among the cohort of assistant professors hired every year, these exceptionally promising future stars will be thus enabled to embark on their journey of exploration and inquiry with abundant resources for purchasing sophisticated equipment and building a research group of adequate size without having to depend on government funding in the crucial initial years of their careers.

Grant funds in all three cases would be flexible in their use, covering research assistance, materials, access to high-performance computer resources, equipment, or laboratory set up. This allows the University to support aspects of research not often funded by traditional resources, though essential not only to the scientific endeavors themselves but also to the recruitment and retention of stellar faculty. It is these faculty members, both junior and senior, who are critical to creating a community of world-class scientific scholars.

The University would create a quasi-endowment for these funds to allow maximum nimbleness. Principal would be invested and provide a stream of income to make grants, and, if the proposals warranted more funding than available from the income, the corpus could be accessed to support those projects. In the longer term, these three funds would create a sustained flow of support for brilliant research at Princeton that will change science.