The Strategic Importance of Fundamental Science for FP10

Executive Summary

Fundamental science, including particle physics, astroparticle physics, astronomy, cosmology, astrophysics and nuclear physics, provides a strong foundation for European scientific leadership, technological sovereignty, and human capital. Exploiting world-leading state-of-the-art research infrastructures, it generates transformative scientific knowledge, seeds breakthrough technologies that later diffuse across the wider economy and society, and trains a uniquely skilled workforce that will be key actors for an innovative, sustainable and competitive Europe. This impact accrues over decades and relies on a stable, long-term financial commitment. Competitors worldwide are investing heavily in these areas of research. Sustained funding in FP10 for basic research will secure irreplaceable expertise, keep first-mover advantage in the associated technologies, and maintain hard-won leadership that took generations to establish, with lasting benefits for the Union, its citizens and its economy.

We invite the European Commission to ensure that FP10 protects ambitious funding for curiosity-driven basic research and its enabling infrastructures, as a strategic investment in the Union's competitiveness, resilience, and autonomy.

1. European scientific leadership as a strategic asset on the global stage

Fundamental science addresses some of humankind most profound questions — the constituents of matter, the origin and evolution of the Universe, and the laws that govern them. Europe holds a position of global leadership in many of these research domains, in particular in several areas in particle physics, astroparticle physics, and nuclear physics, as well as cosmology, astronomy and astrophysics, and hosts flagship infrastructures such as CERN, astroparticle physics experiments, underground laboratories, nuclear facilities and the world's foremost ground-based astronomical observatories. This leadership is a strategic asset: it brings cultural and scientific prestige and put Europe in a unique position to set the research agenda in these areas and to lead the development of new groundbreaking technologies. This position was built over generations of scientists through sustained public investment and strong international collaboration. Europe should protect this privileged role and FP10 represents a decisive opportunity to consolidate it.

2. Technological innovation and economic return, autonomy and resilience

The extreme technical demands of fundamental research make it a powerful and well-documented engine of innovation. Its origins, disconnected from immediate industrial or commercial pressures, emerges from curiosity-driven research, often decades before its practical applications can be imagined. What is basic research today, may become the applied science of tomorrow and ultimately drive the technology of the future. The World Wide Web, medical imaging and hadron therapy, superconducting magnets, advanced detectors and sensors, vacuum and cryogenic technologies, large-scale data processing and foundational advances in quantum computing originated from or were significantly shaped by fundamental research. The economic return of this disruptive technology cannot be overlooked: CERN's World Wide Web laid the foundation for the digital economy and remains the backbone of digital commerce, a multi-trillion-dollar sector annually; the CERN ROOT/GEANT4 software is estimated to have an avoided-cost value of several billion; the CCD sensors, refined through decades of astronomical instrumentation, now underpin a global image-sensor market worth several tens of billions EUR. Technology breakthroughs seed start-ups and SMEs, major infrastructures sustain high-value contracts to European industry, strengthening deep-tech supply chains and markets central to the twin green and digital transitions, providing critical tools to address global challenges and contributing directly to European strategic autonomy.

3. Human capital and the skills base

Fundamental science is an unrivalled training ground for highly advanced talent. Early career researchers develop top skills in problem solving, with the ability to provide innovative solutions to complex unseen problems, and therefore are an invaluable asset for academia and industry. They acquire strong expertise in computing, artificial intelligence and machine learning, advanced instrumentation, statistical analysis, and the management of complex international projects. A significant fraction subsequently moves into industry, finance, healthcare, public administration, bringing their skills to these sectors. By offering world-class research opportunities, via FP10, Europe can prepare, attract and retain outstanding scientists within the European Research Area, countering the loss of talent to other regions and reinforcing the skilled workforce on which Europe’s long-term competitiveness ultimately depends.

4. Strategic international cooperation and scientific diplomacy

These fields of research are models of effective international cooperation: large infrastructures and facilities convene partners from across and beyond the Union around shared scientific goals, enhancing European influence and standard-setting capacity, and building stable channels of collaboration that endure through periods of geopolitical tension, particularly important in the current climate. Large international infrastructures and scientific networks are able to sustain channels of communication that purely diplomatic instruments cannot easily replicate. In this way, Europe projects its values of openness, cooperation and peaceful dialogue globally.

5. Societal and cultural value

Beyond its measurable returns, fundamental science answers questions of deep and universal human significance, and in doing so inspires successive generations to pursue science, technology, engineering, and mathematics. Its public engagement — through open data, outreach, and dissemination — strengthens scientific literacy and evidence-based decision-making across society, a societal value of growing importance.