



HOLY SPIRIT

PREPARATORY SCHOOL

11th Grade Physics

Summer Assignments

Academic Year - 2022-2023

Course Information

Department: STEM

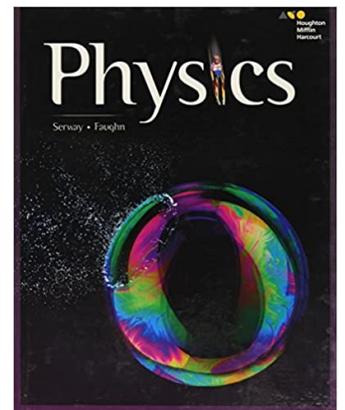
Class Description: Physics is the study of how things move in space and time and its principles are used in fields that range from engineering to medicine. By studying the fundamental interactions in the natural world, students will more clearly see the reflection of God's glory in the design of the physical universe. The class explores the fundamental laws of mechanics, electricity, and optics, through measurement, experimentation, critical thinking, and problem solving.

Textbook or Materials Required (Picture of book included):

Houghton Mifflin Harcourt, *Physics* ISBN 13: 9780544817739

(OPTIONAL; buy if you'd like a reference throughout the year, but not required for class)

Contact afoutch@holyspiritprep.org for any questions



Summer Assignment

Learning objectives

- Explain the purpose of learning physics and the natural sciences as it pertains to an integrated life of faith

Estimate time of completion

- 0.5-1 hour

Details of Assignment

- Read the article at [this link](#). The article is also copied on this document. Annotate the article and be prepared to discuss on the first day of school (Wednesday, August 17th).

How Can Modern Science Purify Christianity from Error and Superstition?

by Jordan A. Haddad

September 12, 2018



John Paul II once [wrote](#) to Fr. George Coyne, S.J., the former director of the Vatican Observatory, that “Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes. Each can draw the other into a wider world, a world in which both can flourish.”

Setting aside the fascinating fact that the Vatican has its very own [observatory](#), whose Vatican Advanced Technology Telescope (VATT) is located on Mount Graham in southeastern Arizona, the statement itself issued by the former pontiff contains a potentially scandalizing assertion if given only a superficial reading. How could it be at all possible that science, especially a modern science in whose name the deposit of faith has been greatly assailed in recent history, can “purify religion,” particularly Christianity, “from error and superstition” without at the same time introducing a

corruption of revelation and faith? Moreover, how can religion in general and Christianity in particular “purify science from idolatry and false absolutes” without forcing science to be at variance with its own particular method and practice?

These are two of the central questions that stand at the heart of the faith-science relationship. But, before addressing them directly, a word ought to be said about the relationship existing between Christianity and modern science in general.

It is a common misconception that Christianity and modern science are natural sworn enemies from beginning to end. But, this is not so, or at least it is not necessarily so. As Dr. Stephen Barr, the renowned theoretical particle physicist of the University of Delaware and the president of the [Society of Catholic Scientists](#), has argued elsewhere in his books *Modern Physics and Ancient Faith* and in his collection of essays entitled *The Believing Scientist*, the real and interminable tension lies between not Christian faith and modern science but between religion and scientific materialism, which will be touched upon later in this essay.

Christianity paved the way for modern science in many important ways, both in terms of some its earliest Catholic “fathers” (such as René Descartes, Nicolaus Copernicus, Galileo Galilei, Fr. Gregory Mendel, and Bishop Nicolas Steno) and some of its most significant champions (such as Antoine Laurent Lavoisier, Giuseppe Mercuri, and Fr. Georges Lemaitre). Furthermore, and perhaps even more importantly, Christianity was also essential to the emergence of modern science by providing the necessary preconditions for its advent. This is so by virtue of Christianity’s disenchantment of the world and purification of the human mind of the perceived pervasive activity of the capricious pagan gods and other fickle lesser beings present throughout the world. It did so in favor of a divinely ordered and intrinsically good creation proceeding from the all-powerful, all-wise God, who is not in any way identical with it. This then opened the way for an orderly and dependable study of causality within the created order without fear that it might be inherently unintelligible or that it might react violently to one’s impudent curiosity.

With this in mind, we can now proceed to the questions of how the findings of modern science can contribute positively to the Christian faith and how Christianity can serve the practice of the modern scientific endeavor.

Christianity’s Contribution to Modern Science

Modern science is distinguished from its natural philosophy predecessor, with its high concern for the four causes of Aristotle, by its focus on the paradigm of the scientific and empirical method. The substance of the scientific method involves such things as the formulations of hypotheses, empirical observation and measurement, the control and elimination of disruptive variables, repeatable testing and experimentation, and the

critical use of reason to form verifiable and falsifiable theories that can best account for the whole gamut of data that falls within one's field of study. However, because there is a wide variety of scientific fields of study, the actual performance of such disciplines—from quantum physics and astrochemistry to geology and molecular biology—will differ widely, especially when one's area of study either defies direct observation, involves the re-construction of universe formation, or ascends into the lofty realms of mathematical abstraction. This is all to say that the actual carrying out of the modern scientific disciplines contains within itself a great variety of creativity and diversity of technique and procedure.

Nonetheless, the modern empirical sciences do in fact have a great deal in common, especially when understood in light of their limitations. The limitation of modern science is defined by its object of study, which is the secondary causality intrinsic to the natural world, or intra-“worldly” factors. The modern sciences, particularly the modern natural sciences, seek their answers through a meticulous and unrelenting investigation of how created things interact with one another, whether it be the effect of one body upon another, as is studied in chemistry, biology, neuroscience, geology, etc., or one force upon another force or body, as is studied in physics, all of which is accompanied by the field of mathematics in one way or another.

Such a particularized realm of inquiry has not only realized an incredible amount of success by coming to know the truth of why things actually function the way they do, but also how our universe and world have come to exist in the way that it has in accordance with the laws of its development. It has also generated a tremendous amount of progress in the production of technological innovations, which has had mixed results for the human family (cf. the development of vaccines and improved farming techniques and equipment, as well as more harmful things such as the atom bomb and chemical weaponry). The mixed bag of technological innovations was bound to happen in a fallen world such as ours so long as the human person retains the ability to exercise their free will for better or for worse. Technology, however, is not merely a morally neutral discipline that receives its ethical coloring depending on its use. One must also keep in mind the type of worldview that scientific and technological reductionism fosters when unreflectively extended beyond its proper domain to the whole of human experience of reality as such.

The specified object of inquiry of the whole range of the modern sciences has been its glory but also its limitation. It has been its glory because it focuses reason to proceed according to set rules and avenues of thought and investigation; it has been its limitation because it cannot thereby rightly pronounce upon questions or objects that fall outside of its method.

Modern science is not only limited when it comes to answering such questions as to the *why* of the existence of universe at all, but it is also limited in other ways as well. Such limitations include the questions of the existence and nature of God, the divine nature of

Christ, the reality and shape of moral values and imperatives, the existence of spiritual entities such as angels, the presence of the immortal human soul, the presence and activity of grace, the truth of human dignity, the possibility of miracles, and even the very value of scientific research itself, to name just a few of the more pertinent questions. These questions and others like them require a form of reasoning that falls outside that of modern natural science.

It is not that science *could* answer these questions one day if given enough time, talent, and resources, but, rather, that science *simply cannot* answer such questions because they fall outside of its purview. The recognition of such facts does not in any way denigrate the integrity of modern science but is instead merely an honest assessment of the nature of its inquiry and the limits of its reach. Such an evaluation of science could only be considered derogatory if one has already set science up as mode of inquiry that stretches beyond its objects of interest and has instead corrupted its true nature by trying to make something of it that it simply is not.

This brings us immediately to the statement of John Paul II mentioned above that “religion can purify science from idolatry and false absolutes.” From what has thus far been said, religion in general, and Christianity in particular, liberate the true freedom and purpose of modern science from those practitioners who would (in the name of science) make claims that exceed its abilities in the form of a scientism, and in this way is a guardian of science itself. This function pertains not only to religion but also to philosophy, whose speculative consideration of science even more readily delineates the true nature and extent of the scientific program. In this way science is prevented from setting itself up as a “false absolute”.

There is another way, however, in which science needs Christianity in particular and religion in general. Modern science needs Christianity because the knowledge gained from science and utilized in the development of new technologies require a corresponding framework of virtues, a moral and religious worldview, wherein these discoveries and inventions can be evaluated for their true worth and utilized well for the benefit of the human community from which they have emerged. This idea is recurring motif throughout the thought of Pope Benedict XVI. In one such instance, the pontiff emeritus writes:

Technical progress does not necessarily coincide with the moral growth of the person; rather, without ethical principles, science, technology, and politics can be used, as has happened and unfortunately still happens, not for the good, but for the harm of individuals and humanity.[1]

Scientific and technological progress require a corresponding spiritual and ethical progress. This is undoubtedly true, or else humanity at large becomes the experimental datum of science, which is a great irony indeed.

However, there is something more here, of which Benedict XVI speaks elsewhere. This

is the reductionism that occurs when the scientific and technological paradigms become the universal paradigms for all human knowledge and experience. This happens when all of reality is reduced to the ultimately meaningless, random arrangement of atoms throughout space and time. When such a worldview predominates, not only is the sacramental character of the created order lost but also the dignity of the human person and the existence of moral imperatives and values. However, when understood in light of the Christian worldview, the whole of the created order that science is rightly intent upon studying takes on new levels of meaning and value. The universe is no longer simply a meaningless assortment of things and forces, but it is also the expression of the divine *logos*, the supremely intelligent Mind of God, which creates and sustains the universe by its first thinking, loving, and willing it.

To study and discern the intelligibility of the created order, then, receives a whole new meaning of previously unimaginable sublimity: it means to think anew what has been first thought by God; it means to think with one's own mind what God has first thought and loved. In this way, scientific inquiry, if done with a humble mind and a worshipful heart, can itself become an act of Christian worship.

Modern Science's Contribution to Christianity

It is a tenet of orthodox Christianity that the fullness of divine revelation has been given once and for all in the person of Jesus Christ himself. He is its culmination and consummation; he is the Word of God through whom the words of God are spoken. He is the "Lamb standing, as though it had been slain" (Rev 5:6), who alone is worthy to break the seven seals of the scroll and to make known its truth, meaning that in Christ alone is found the meaning of the Scriptures and reality at large. It is only in him and through him that any revelation has been made at all, and so upon his ascension to the Father all Revelation has been "closed," as it were. The descent of the Holy Spirit drives this point home even further, for the Holy Spirit was sent not to reveal anything new but simply to preserve, make known, and fructify what has already been given through the inspiration of the Scriptures and the continued guidance and animation of the life of the Church (cf. Jn 14:25-26 & Acts 2).

This is all to say that Christian revelation in its most essential form cannot be fundamentally changed or modified, whether it be through addition (as did Gnosticism) or through subtraction (as did Protestantism). For this reason and for the methodological reasons noted above, it is erroneous to think that any finding of modern science, or philosophy for that matter, could in reality add to or subtract from the essential content and deposit of faith. In what, then, does the positive contribution of modern science consist?

Before directly answering this question, it is worth pausing a moment over the question of what Christian theology is, because it is only by knowing how reason relates to the

content of faith that we can discern how the findings of science can contribute positively to it.

Aidan Nichols, O.P., in his *The Shape of Catholic Theology* defines theology as “the disciplined exploration of what is contained in revelation.”^[2] This is a fine description because it points to the two most important aspects of theology, which are its exploratory character and the object of its exploration. Theology explores, reflects upon, and expounds revelation by way of reason. Hence, one would be hard-pressed to imagine a more positive account of the capabilities of reason than is found in Christianity. Reason can not only explore the ins and outs of the universe and her laws, but it can also grapple with what God has revealed, how it relates to other non-revealed truths, and what it all actually means.

Reason engaged in theological work, however, is not first and foremost concerned with the created order per se but with God, who is the source and font of all things. However, theology is not *only* concerned with God, but it is also concerned with *all* things insofar as they relate to God in light of what he has revealed. St. Thomas Aquinas makes this distinction in his *Summa Contra Gentiles* Bk. 2, Ch. 4, by writing that, whereas the philosopher considers things as belonging to them by their own nature and as proper causes (such as the nature of fire to be hot, for example), the believer considers such things only as they relate to God (that fire is created by God, manifests his power, and is subject to his will).

Additionally, the content of revelation concerns the created order in other equally important ways. Because God’s revelation consists of the eternal and divine “breaking into” of that which is temporal and human, it has significant implications for not only mankind but the whole of creation. Furthermore, the content upon which theology reasons and reflects is conditioned by and dependent in many important ways upon human knowledge and understanding insofar as the divine words of God are expressed in human words. *Dei Verbum*, the Second Vatican Council’s Dogmatic Constitution on Divine Revelation, speaks of this when it recognizes that God speaks in Scripture through human authors, whose own modes of expression must be studied in order to determine what God has in fact asserted. This means that the sacred authors are true authors and are not simply secretaries or transcribers writing down what was dictated to them. They genuinely participate in the divine communication in and through their own words, expressions, thoughts, worldview, and every other particular limitation that exists for humans, all under the supernaturally guided influence and inspiration of the Holy Spirit who is also a true author of Scripture. “For the words of God, expressed in human language, have been made like human discourse, just as the word of the eternal Father, when He took to Himself the flesh of human weakness, was in every way made like men” (DV, §13).

None of this is to say that divine revelation is a mere cipher or symbol of that which is ineffable and therefore, in the final analysis, empty of content. I am, instead, making a

much more obvious, much less subtle, philosophical point: because revelation is given by God but communicated through humans, its expression necessarily relies upon their own limited understanding of the created order when communicating the words of God.

This assertion, if taken at face value, would seem to pose a great threat to Christian revelation and doctrine. After all, the whole of the Scriptures are written many, [many centuries before the advent of modern science](#) and is therefore potentially filled with scientific inaccuracies. What, then is one to make of the above-noted fact that Christian revelation admits of no real addition or subtraction?

This problem, however, is really no problem at all. Perhaps it would pose an insoluble dilemma if God did in fact dictate the words of Scripture and the human author merely transcribed them into writing; however, that is not a genuinely Catholic approach to Scripture as it has been developed and understood. Instead, if God uses human authors as true authors, then we should expect the expressions of Scripture to be consistent with the scientific worldview of their day, so long as it does not interfere with the divine communication of supernatural knowledge and salvation. This, after all, is the purpose of all Scripture and all revelation: to communicate and effect the salvation of mankind through Jesus Christ and his Church for the glory of God and the manifestation of his divine beneficence and love. So, Scripture simply should not be read for its scientific knowledge but for its divine and salvific knowledge instead. As Galileo wrote, “The Bible shows the way to go to heaven, not the way the heavens go.”

Beyond Scriptural interpretation there are those moments in theological reflection wherein its content is tied up, so to speak, with scientific concerns. These are places where theology and science intersect much more directly and intimately and where an advancement in scientific knowledge directly benefits theology by improving the natural knowledge upon which it relies. Such an example of this intersection, which Barr calls attention to in Chapter 17 of [The Believing Scientist](#), is the question of the location of heaven and hell. Whereas it was previously believed that hell was a definite place on the earth, or even the moon or the sun, and heaven was a place above the earth, knowledge gained from advances in modern science has revealed to us that nothing exists in the earth except oil, magma, and rock, generally speaking, that no such place exists on the moon or the sun (or at least it seems highly unlikely!), and that there is no heaven literally above. What this recognition leads the theologian to do is to think more deeply about the nature of heaven and hell as the presence or absence of one’s relationship with God and the human family and less in terms of location and place, which are existentially irrelevant.

Another example of such an intersection is the [question](#) of whether or not it is fitting to think that Christ suffered from disease in light of knowledge gained from twentieth century biology. Whereas it was previously reasonable to conclude that Christ did not suffer from diseases, since pre-twentieth century biology knew not of diseases that result from neither an imperfection of the flesh nor from a unhealthy life-style, neither of

which are fitting to ascribe to Christ, contemporary biology knows that some diseases result simply from the workings of harmful foreign agents such as bacteria and viruses. It is then reasonable to think that just as Christ suffered at the hands of the Roman guards, so too he most likely suffered from equally foreign, external agents in the form of harmful bacteria and viruses. Many other examples abound when one begins to reflect more intentionally on Christian revelation's intimate relationship to mankind and the universe at large, which modern science can increasingly tell us more and more about.

In these ways and more, "science can purify religion from error and superstition." Much of the knowledge gained from modern science, however, does not directly contribute to theological reflection in any significant or immediate way. Science cannot tell us anything of the divine nature, nor does theology directly benefit from a greater knowledge of the periodic table, for example. However, there is one other important way in which science at large contributes to Christian faith and theology, which was also discussed above when speaking about how theology contributes to the practice of science.

It is a central tenet of Christianity that all things exist because they were first thought, known, and loved by God, and are thereby spoken into existence by his divine Word, who we later learn in the Gospel of John is the Son of God who becomes incarnate in Christ. Everything then, from the most abstract mathematics and physics to the study of that which is most concrete and ordinary, reveals the very mind of God and proclaims the splendor of his glory because it expresses his supreme wisdom and goodness. This being the case, every scientific investigation, every experiment, hypothesis, and theory, that attempts to discern the order and intelligibility of the universe is an exercise that seeks to make known the power and wisdom of God as Creator. In this way, science does a tremendous service to the Christian faith and theology, for by deepening our knowledge of the natural order, the human race is better able to proclaim along with the Psalmist that "The heavens are telling the glory of God, and the firmament proclaims his handiwork" (Ps 19:1)!

[1] Pope Benedict XVI., "The Ambiguity of Technological Progress" in *A Reason Open to God: On Universities, Education & Culture*, p. 267.

[2] Aidan Nichols, O.P., *The Shape of Catholic Theology* (Collegeville, MN: The Liturgical Press, 1991), 32.

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