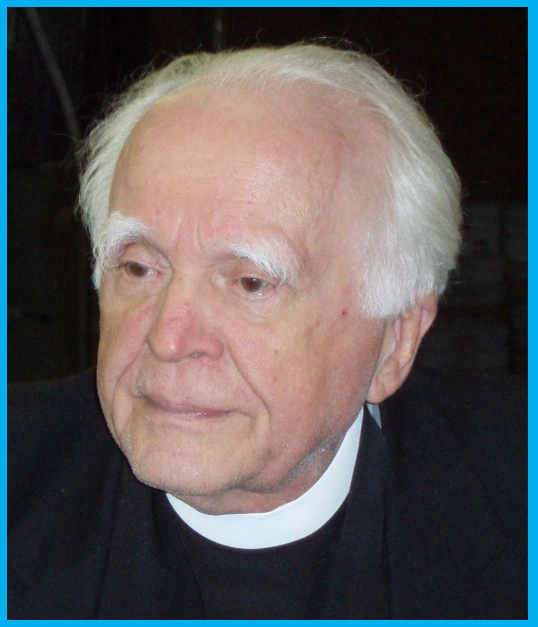
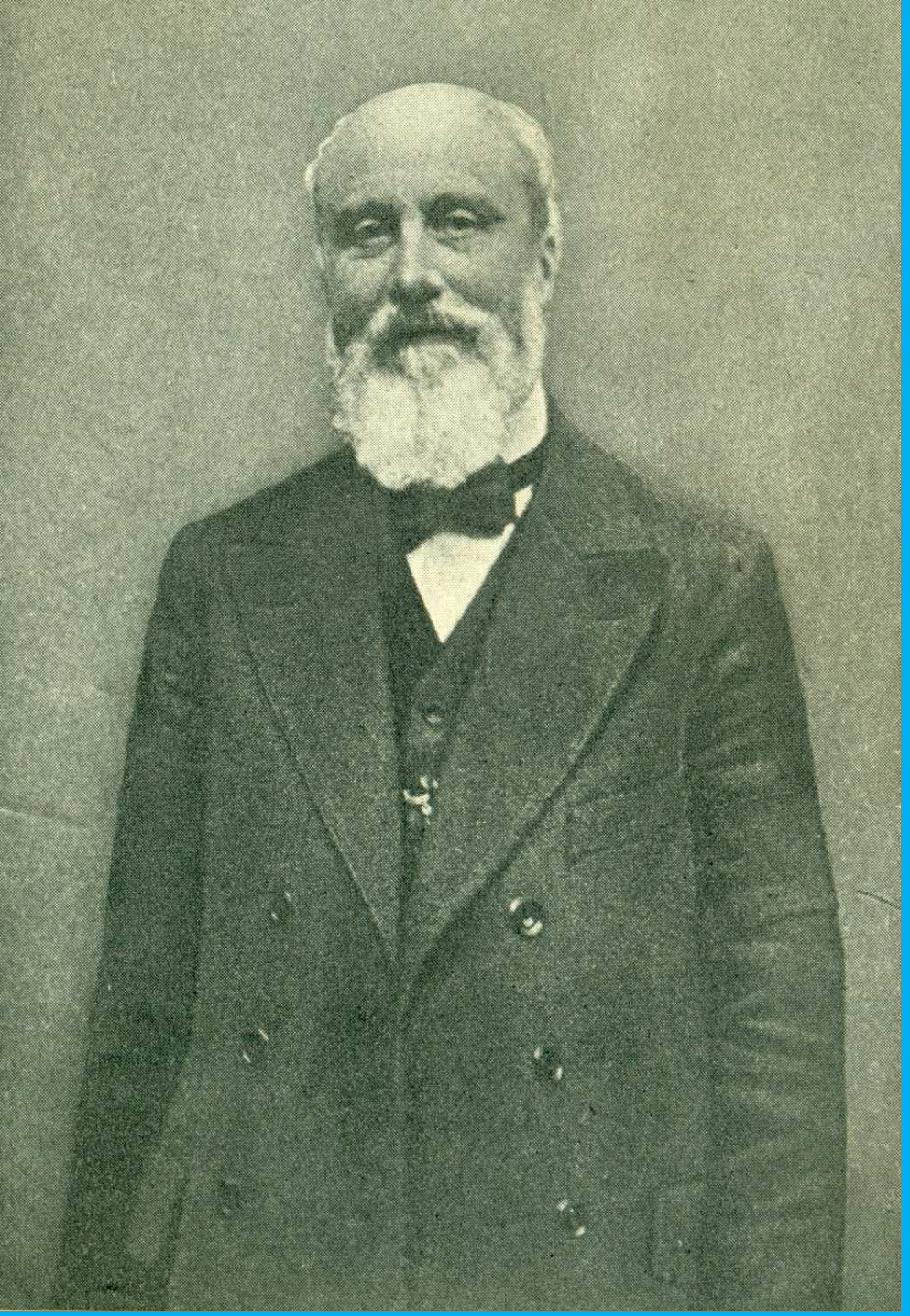
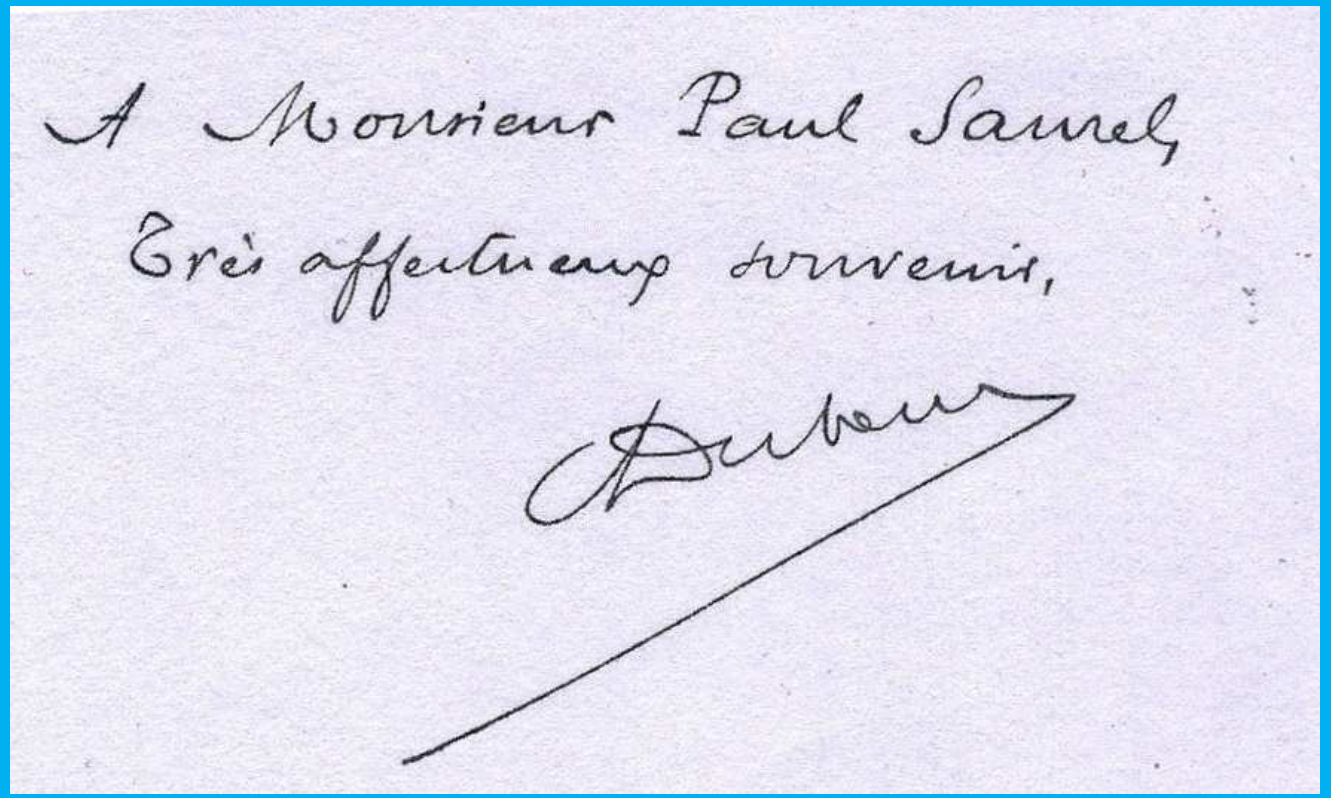
Pierre Duhem, Stanley Jaki and the birth of science



On the so called conflict between science and the Catholic Church

Stanley Jaki
and
Antonio Colombo
Nov. 11, 1999.
In the background
the Lake Maggiore.





Pierre Maurice Marie Duhem
Paris, 9 June 1861
Cabrespine, 14 September 1916


North Sea
UNITED KINGDOM
English Channel
Strait of Dover
Dunkirk
Calais
Lille
BELGIUM
Nord-Pas-de-Calais
LUXEMBOURG
Cherbourg
Amiens
Le Havre
Rouen
Haute Normandie
Paris
Reims
Caen
Basse-Normandie
Mont Saint-Michel
Versailles
Île-de-France
Champagne Ardenne
Lorraine
Alsace
Nancy
GERMANY
Strasbourg
Brest
Rennes
Bretagne
Le Mans
Orleans
Troyes
Pays de la Loire
FRANCE
Belle-Ile
Tours
Centre
Besancon
Dijon
Nantes
Bourges
Bourgogne
Franche Comté
SWITZERLAND
Ile d'Yeu
Poitiers
Ile de Re
La Rochelle
Ile d'Oleron
Limoges
Rhône-Alpes
Lyon
Poitou-Charentes
Limousin
Clermont Ferrand
Chambery
ITALY
Bay of Biscay
Auvergne
Bordeaux
Valnce
Aquitaine
Midi-Pyrénées
Provence Alpes Côte-d'Azur
Montauban
Languedoc Roussillon
Avignon
Nice
Montpellier
Toulouse
Cannes
Ligurian Sea
Pau
Cabrespine
Marseilles
Toulon
Perpignan
Gulf of Lion
Port-Bou
Corse
Corsica
SPAIN
ANDORRA

Life

1861 Born in Paris, 9 April
1872 Stanislas College
1882 École Normale (Scientific Section)
1884 Thesis in physics rejected (Berthelot)
1887 Lecturer at the University of Lille
1888 Thesis in Mathematics on the Theory of Magnetism
1890 October, gets married (in Paris) with Adele Chayet
1891 Hélène Duhem born 29 September
1892 Wife's death 28 July
1893 Rennes
1894 Bordeaux (*le chemin de Paris*)
1895 Professor of Theoretical Physics
1900 *Membre Correspondent* of the Academy of Sciences of Paris
1916 Death in Cabrespine, 14 September

Main Publications:

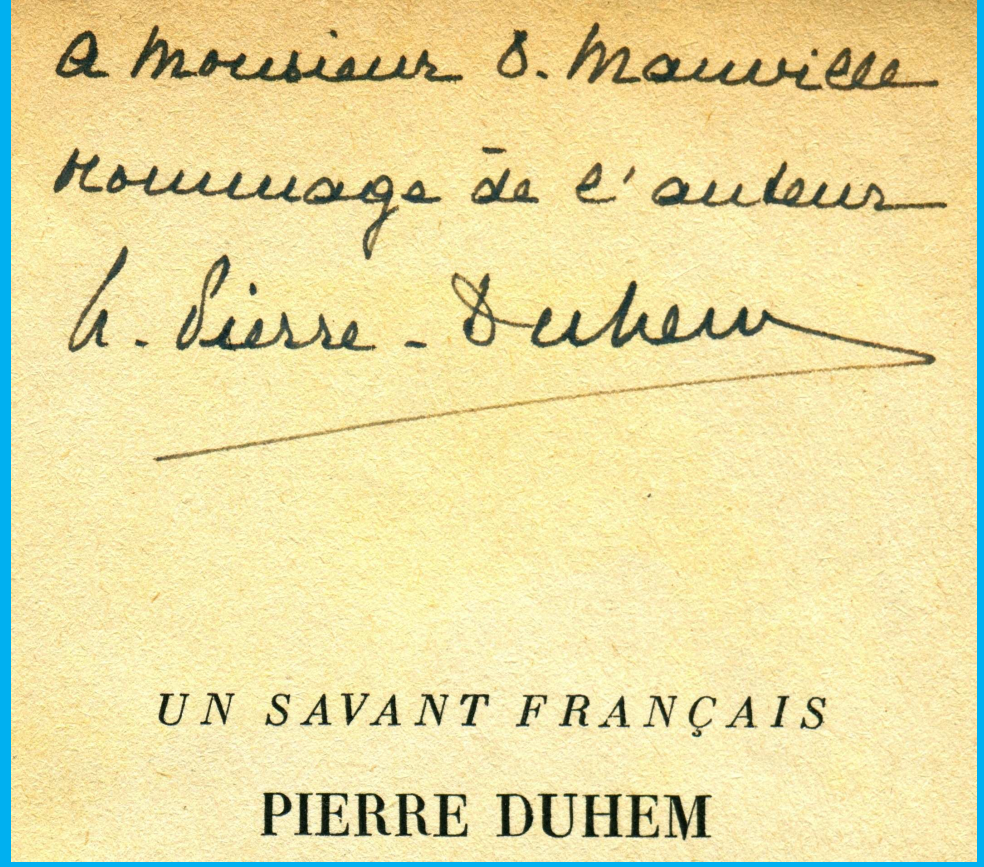
(a total of over 550 between essays and books)

* 1883 Au pays des gorilles (satire against Darwinian materialism)
* 1886 Le potentiel thermodynamique et ses applications à la mécanique chimique, et aux phénomènes électriques.
* 1891 Hydrodynamique, Élasticité, Acoustique
* 1891-1892 Leçons su l'électricité et le magnetisme (3 volumes)
* 1893 Introduction à la mécanique chimique
* 1903 L'évolution de la mécanique
* 1906 La théorie physique: son object et sa structure
* 1906-1909 Études sur Leonard de Vinci
* 1908 *Sozein ta phainomena* (To Save the Phenomena)
* 1911 Traite d'Energetique (2 Volumes)
* 1913-1959 Le système du monde: Histoire des doctrines cosmologiques de Platon a Copernic
* 1915 La science allemande

Duhem the scientist

Duhem's interests fell roughly into periods.
His work in thermodynamics and electromagnetism was predominantly in the period 1884-1900; he returned to the latter between 1913 and 1916.
His interest in the philosophy of science was mostly between 1893 and 1906, and the history of science primarily between 1904 and 1916, although his earliest papers date from 1895.
Finally he concentrated on hydrodynamics and elasticity between 1900 and 1906.

-- Donald G. Miller, *Physics today*, December 1966



Hélène Pierre-Duhem
Lille, 29 September 1891
Carcassonne, 24 April 1974

Hélène Duhem

1891 Born in Lille, 29 September
1892 Death of her mother
1906 Death of her grandmother
1916 Death of her father
1933 Decides to devote his life to the memory of his father
1936 *Un Savant Français: Pierre Duhem*
1954-1959 Publication of the last five volumes of *Le système du monde,* and reprint of other works of Pierre Duhem
1974 Dies in Carcassonne, 24 April

Duhem the historian

Reverence for the historical record
Reliance on original sources (Latin and Greek)
Duhem dealt at first with the History of mechanics

Nothing between Aristotle and Leonardo / Galileo?

Science does not happen in a vacuum:
«The science of mechanics and physics derives in an uninterrupted sequence of hardly visible improvements from doctrines professed in medieval school. The pretended intellectual revolutions were all too often but slow and long-prepared evolutions. The so-called renaissances were often but unjust and sterile reactions. Respect for tradition is an essential condition of scientific progress.»

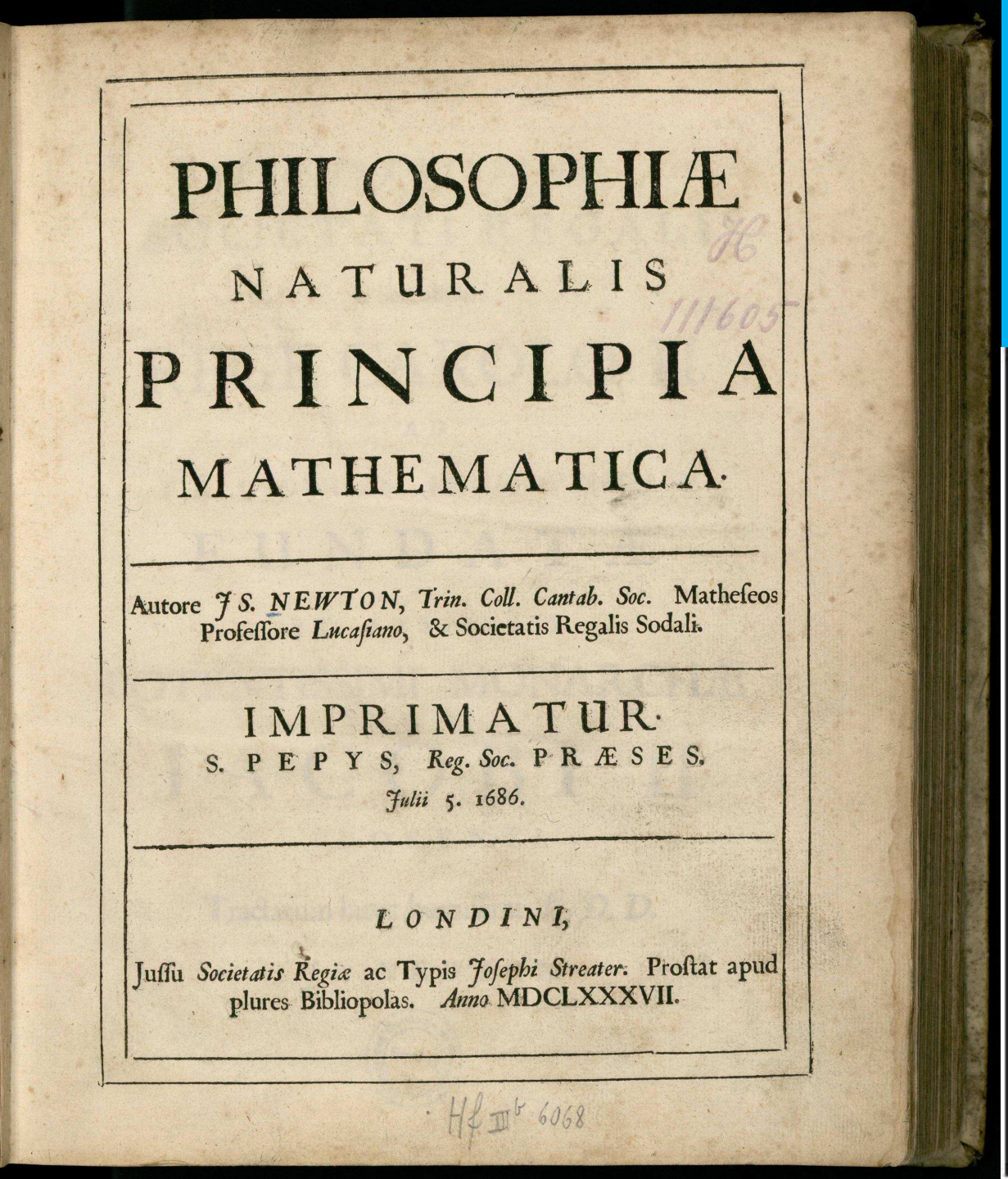
-- Pierre Duhem, *Les origines de la statique*, p. 2

Middle Ages and Aristotle

- Translation of Aristotles' works (from XI Century)
- Incompatibility of Aristotles doctrine with Christian Revelation
- Etienne Tempier (Bishop of Paris) condemns 219 propositions (1277)

«If we were to specify the birthdate of modern science, we should undoubtely choose that year, 1277.»

- --Pierre Duhem, *Etudes sur Léonard de Vinci*, II, 432



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA.

Autore *J S. NEWTON*, *Trin. Coll. Cantab. Soc.* Matheſeos Profeſſore *Lucaſiano*, & Societatis Regalis Sodali.

IMPRIMATUR.
S. PEPYS, *Reg. Soc.* PRÆSES.
Julii 5. 1686.

LONDINI,
Juſſu *Societatis Regiæ* ac Typis *Joſephi Streater*. Proſtat apud plures Bibliopolas. *Anno* MDCLXXXVII.

Newton's Laws of motion

First Law
Objects at rest remain at rest and objects in motion remain in motion in a straight line unless acted upon by an unbalanced force.

Second Law
Force equals mass times acceleration (or f = ma).

Third Law
For every action there is an equal and opposite reaction.

Jean Buridan (circa 1295-1361)

- Master of Arts (not a theologian)
- Rector of the University of Paris for some time
- Introduced the theory of *impetus*
- Commentet works of Aristotle, particularly *De Coelo* and *Physica*
- Ioannis Buridani Expositio Et Quaestiones in Aristotelis Physicam Ad Albertum de Saxonia Attributae. Tome III: Quaestiones (Liber IV - Liber VIII)
- Copies of his books went to other European universities and were familiar to Copernicus and Descartes

sibi resistentes et etiam cum non appareat ex biblia q̄
sint intelligentie que appropriate moueāt corpora ce
lestia posset dici q̄ non apparet necessitas ponendi hu
iusmodi intelligentias q̄ diceretur q̄ deus q̄n creauit
mundum vnūquenq̄ orbium celestiū mouit sicut sibi
placuit et mouendo eos impressit sibi impetus moven
tes eos absq̄ hoc q̄ amplius moueret eos nisi per mo
dum generalis influentie sicut ipse concurrit coagen-
do ad omnia que aguntur sic em̄ septima die requie-
uit ab omni opere q̄d patrarat ꝓmittendo aliis actio-
nes et passiones adminicē et illi impetus impressi cor-
poribus celestibus non postea remittebātur vel corrū
pebantur q̄ non erat inclinatio corporum celestiū ad
alios motꝰ nec erat resistentia q̄ esset corruptiua vel re
pressiua illius impetus sed hoc non dico assertiue sz vt
a diuinis theologis petaz q̄ in illis doceāt me quomō
possunt hec fieri. ¶ Sz tamen circa hāc opiniones sūt

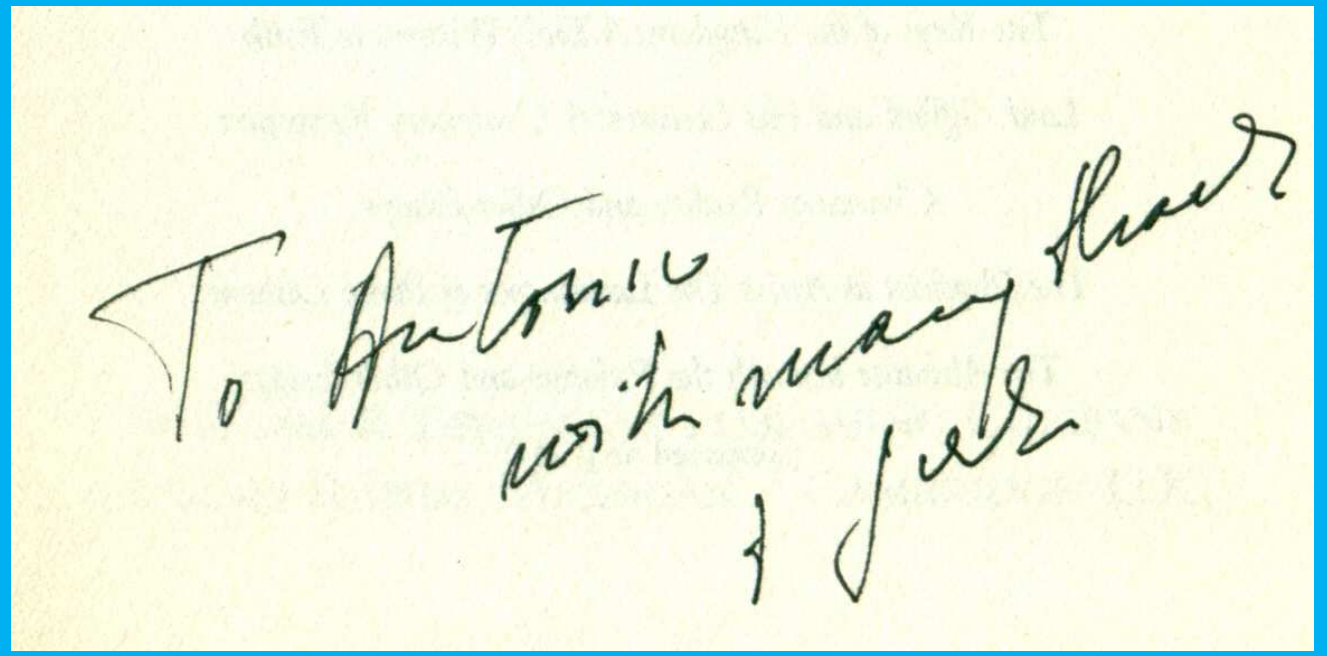
Et etiam cum non appareat ex biblia quod sint intelligentiae quae appropriatae moveant corpora celestia, posset dici quod non apparet necessitas ponendi huiusmodi intelligentias, quia diceretur quod Deus quando creavit mundum, unumquemque orbium caelestium movit sicut sibi placuit et movendo eos impressit sibi impetus movantes eos absque hos quod amplius moveret eos, nisi per modum generalis influentiae, sicut ipse concurrit coagendo ad omnia quae aguntur. Sic enim septima die requievit ab omni opere quod pertrarat committendo aliis actiones et passiones ad invicem. Et illi impetus impressi corporibus celestibus non postea remittebantur vel corrumpebantur quia non erat inclinatio corporum celestium ad alios motus, nec erat resistentia quae esset corruptiva vel repressiva illius impetus. Sed hoc non dico assertive sed ut a divinis theologiis petam quod in illis doceant me quomodo possunt haec fieri.

« On ne voit pas dans la Bible qu'il existe des intelligences chargées de communiquer aux orbes célestes le mouvement qui leur est propre ; il est donc permis de montrer qu'il n'y a aucune nécessité à supposer l'existence de telles intelligences. On pourrait dire, en effet, que Dieu, lorsqu'il a créé le Monde, a mû comme il lui a plu chacun des orbes célestes ; il a imprimé à chacun d'eux un *impetus* qui le meut depuis lors ; en sorte que Dieu n'a plus à mouvoir ces orbes, si ce n'est en exerçant une influence générale, semblable à celle par laquelle il donne son concours à toutes les actions qui se produisent ; c'est ainsi qu'il put se reposer, le septième jour, de l'œuvre qu'il avait achevée, en confiant aux choses créées des actions et des passions mutuelles. Ces *impetus* que Dieu a imprimés aux corps célestes, ne se sont pas affaiblis ni détruits par la suite du temps parce qu'il n'y avait, en ces corps célestes, aucune inclination vers d'autres mouvements, et qu'il n'y avait, non plus, aucune résistance qui pût corrompre et réprimer ces *impetus*. Tout cela, je ne le donne pas comme assuré ; je demanderai seulement à Messieurs les Théologiens de m'enseigner comment peuvent se produire toutes ces choses. »

1. *Magistri* JOHANNIS BURIDAM *Questiones octavi libri physicorum*. Queritur 12° utrum projectum post exitum a manu projicientis moveatur ab aere, vel a quo moveatur. Ms. cit., fol. 106, col. *d*. — JOHANNIS BURIDANI *Subtilissime questiones super octo phisicorum libros Aristotelis*, éd. cit., fol. cxx, col. d, et fol. cxxi, col. a.

Duhem, P., *Le système du monde*, vol. VIII, Hermann, Paris, 1958, p. 328

Also, since from the Bible it does not appear that there are intelligences, which appropriately move the celestial bodies, it could be said that it does not appear necessary to assume [that there are] intelligences of this kind, because it could be said that God, when He created the world, moved each of the celestial orbs as He pleased, and in moving them He impressed in them impetuses which moved them without His having to move them any more except by the method of general influence whereby He concurs as a co-agent in all things which take place. And these impetuses, which He impressed in the celestial bodies, were not decreased nor corrupted afterwards, because there was no inclination of the celestial bodies for other movements, nor was there resistance which would be corruptive or repressive of that impetus. But this I do not say assertively, but to ask from the theologians that in such matters they teach me which way this can happen.



Stanley Ladislas Jaki

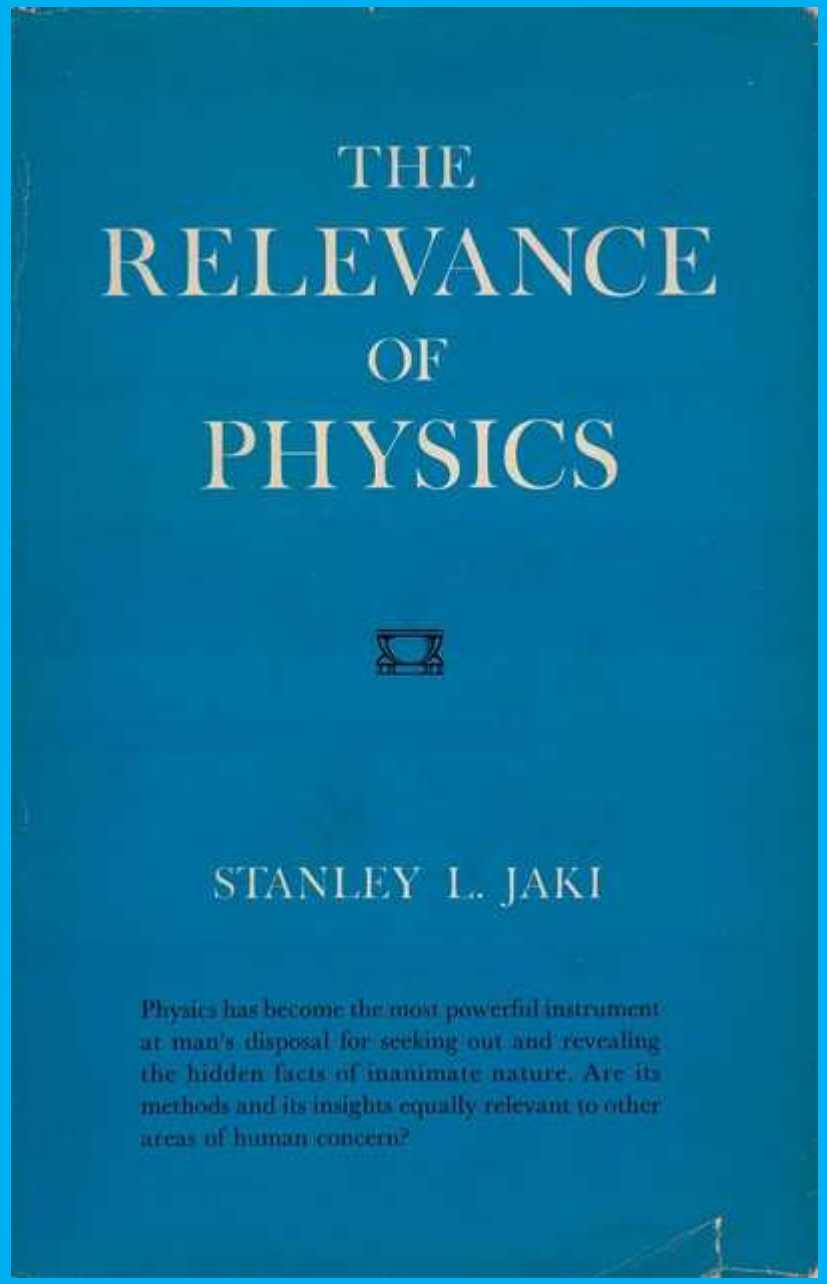
Györ (Hungary) 17 August 1924

Madrid (Spain) 7 April 2009

Life and works

(a total of over 700 between essays and books)

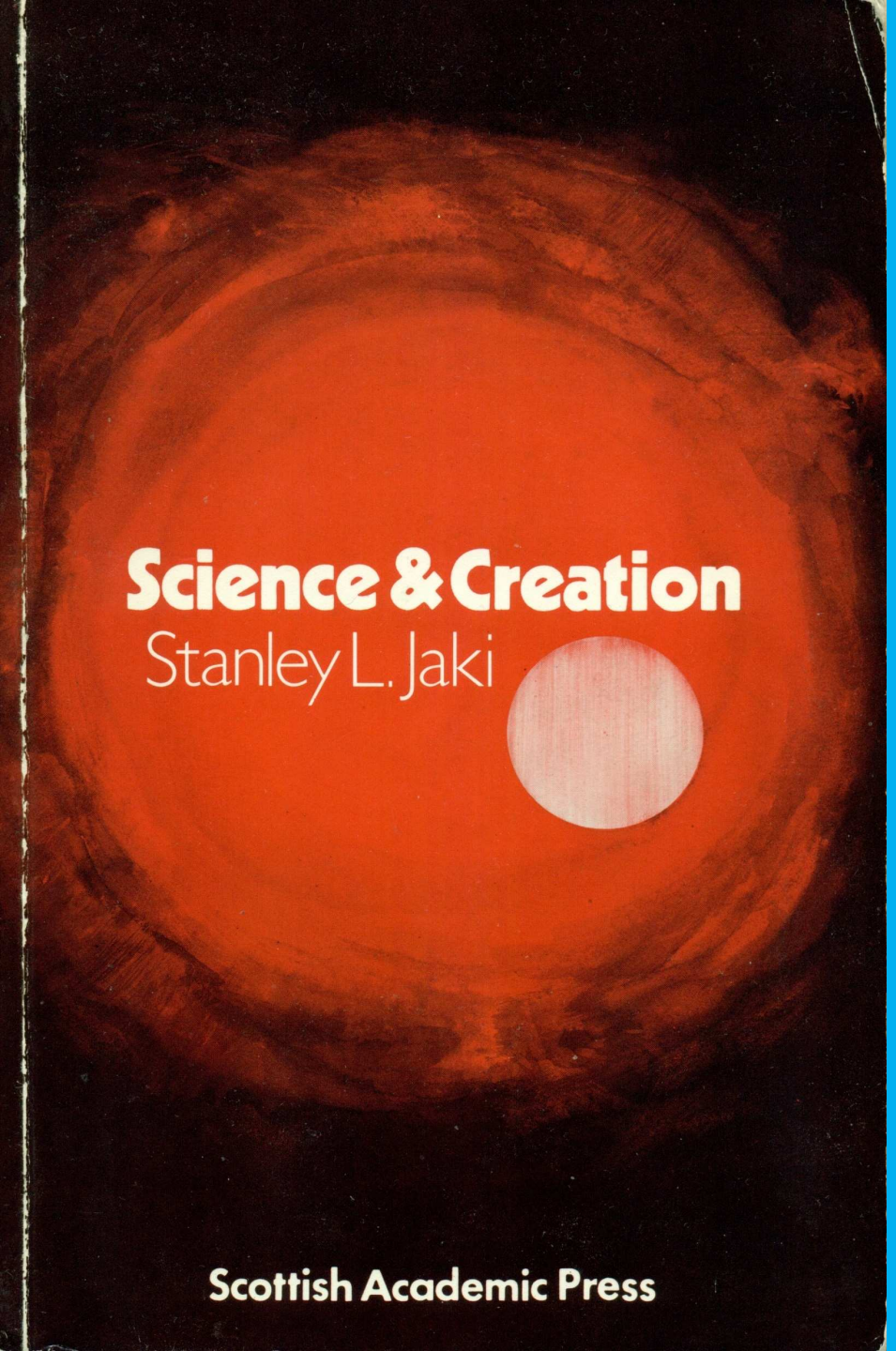
1924 Born in Györ (Hungary), 17 August
1942 Enters the Benedictine convent of Pannonhalma
1947 Sent to Rome for completing studies (Sant'Anselmo)
1948 Ordered priest in Assisi
1950 Degree in Theology (*Les tendences nouvelles de l'ecclesiologie*)
1950 Sent to the United States, as a teacher
1957 Ph.D. in Physics (Fordham)
1966 *The Relevance of Physics*
1966 Professor at Seton Hall (New Jersey) (*Damnatus ad litteras*)
1974 *Science and Creation*
1987 Templeton Prize
1988 *The Savior of Science*
1990 Member of the Pontifical Academy of Science
1996 *Bible and Science*
1998 *Genesis 1 Through the Ages*
2002 *A Mind's Matter* (Intellectual autobiography)
2009 Dies in Madrid, 7 April



Physics has become the most powerful instrument at man's disposal for seeking out and revealing the hidden facts of inanimate nature.

Are its methods and its insights equally relevant to other areas of human concern?

The Duke of Edinburgh right after he gave the Templeton Prize to Father Jaki – in the background Mr. and Mrs. John Templeton



Science and Creation

Examines the reasons for the failed rise of science in all ancient civilization, and for its only birth in the (Christian) European civilization, starting in the Middle Ages.

A logical continuation of the work of Duhem

Jaki and Duhem

"For five or six years, or roughly from 1978-83, I literally lived most of my days with tangible ties to the memory of Pierre Duhem."

-- Stanley Jaki, *A Mind's Matter* , p. 69

(the images below, taken by Stanley Jaki, are from Bordeaux)

Introduction to works of Duhem

1969 To Save the Phenomena
1985 Medieval Cosmology: Theories of Infinity, Place, Time, Void …
1987 Premices philosophiques
1988 The Physicist As Artist: The Landscapes of Pierre Duhem
1989 Au pays des Gorilles
1991 The Origins of Statics
1991 German Sciences
1994 Lettres de Pierre Duhem à sa fille Hélène
1995 (Chinese translation of) La Théorie Physique, son object - sa structure

Books

1984 Uneasy Genius: The Life and Work of Pierre Duhem
1991 Scientist and Catholic: Pierre Duhem (1991 in French, 1996 in Spanish)
1992 Reluctant Heroine: The Life and Work of Hélène Duhem (2007 in French)

再过三个月就是他们的结婚纪念日了。

为了确保《世界的体系》这部不朽著作的后五卷的出版，这项沉重的任务于是也就落在他的第一个孩子海伦身上。对于这本著作，有些知识分子巴不得它永远出版不了才好。在他们看来，这本书是对法国启蒙运动理想的最严重的威胁。法国启蒙运动理想认为，仅仅依靠科学便可以拯救人类。在这本书里，在三卷本的《伦纳德·达·芬奇研究》(1906—1913)，以及在《静力学的起源》(1905—1906)的书中，迪昂向人们表明，科学的真正起源，是基督教的信条真值表，而这些东西正是启蒙运动试图损誉的。在他研究牛顿物理学的中世纪先驱的过程中，这个真值表变得非常明显，他怀着极大的满足把它记录下来。要知道，他整个一生都深深地献身于天主教的信仰中。

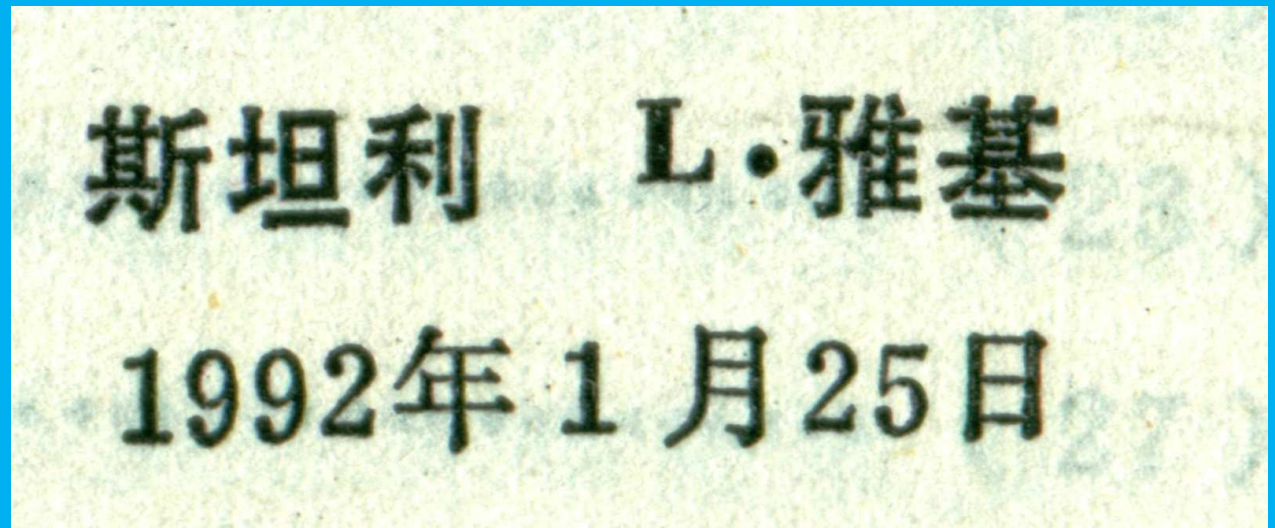
在《物理理论的目的与结构》这本书里，迪昂当然表明了，物理学必须和形而上学分开，尽管关于物质实在的知识本身就是一种形而上学行为。一方面，这意味着不能把形而上学当作任何一种具体的物理理论的起源；另一方面，人们也不可以把物理学变为一种意识形态。物理理论的目的与结构是为物理学服务而且只为物理学服务。这是一个深刻的教益，也是一个迫切需要的教益，在我们这个时代，尤其是在如此众多的人们把科学当作价值之源的时候。科学是提供不了这些价值的，甚至提供不了让人类永远作为自己依靠的、能自己恰当使用的标准与规范。

斯坦利　L·雅基

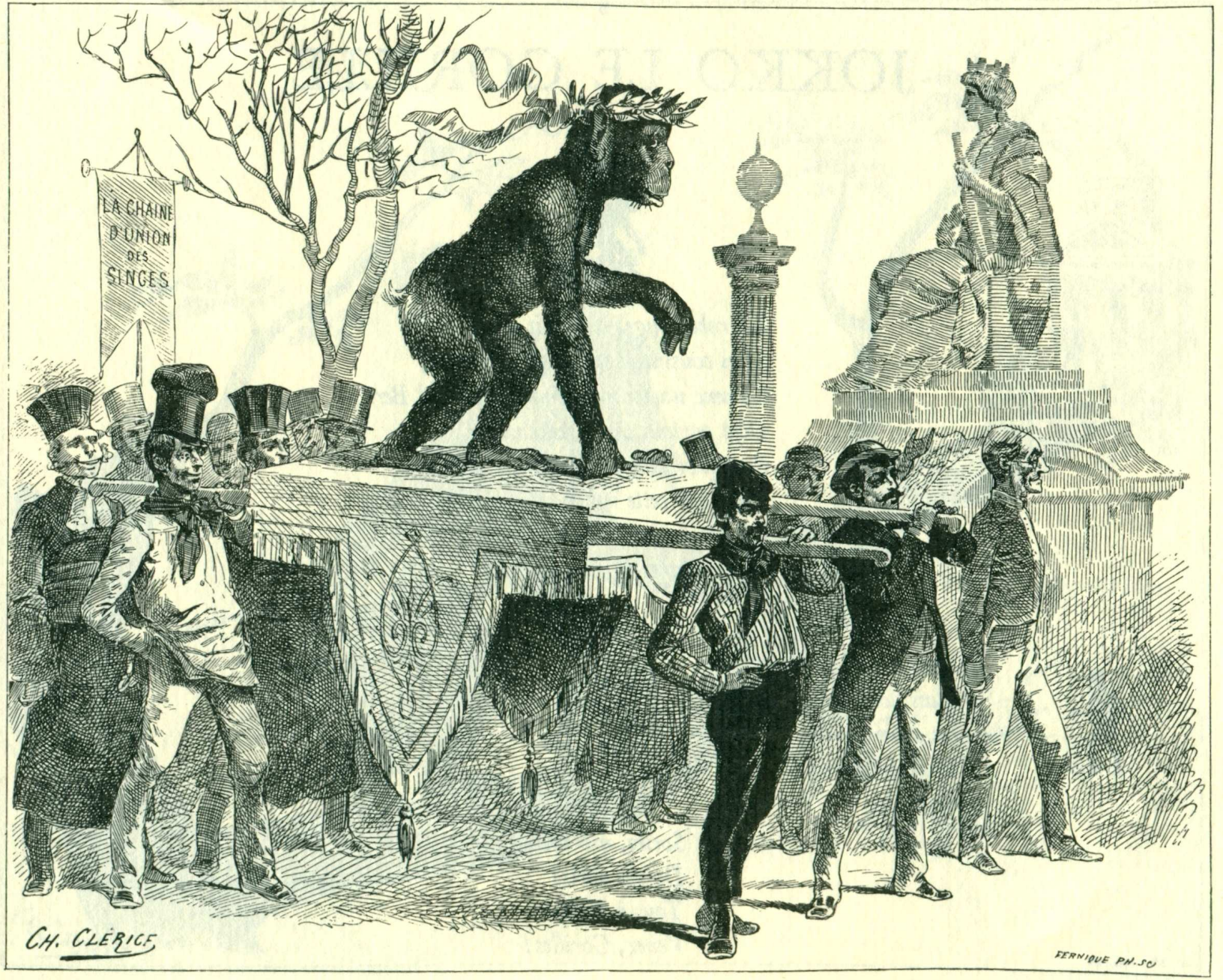
1992年1月25日

From the Introduction to the Chinese translation of Duhem's *La Théorie physique: son objet - sa structure.*

Stanley L. Jaki
25 January 1992



AU PAYS DES GORILLES (EUROPE)



The Savior of Science

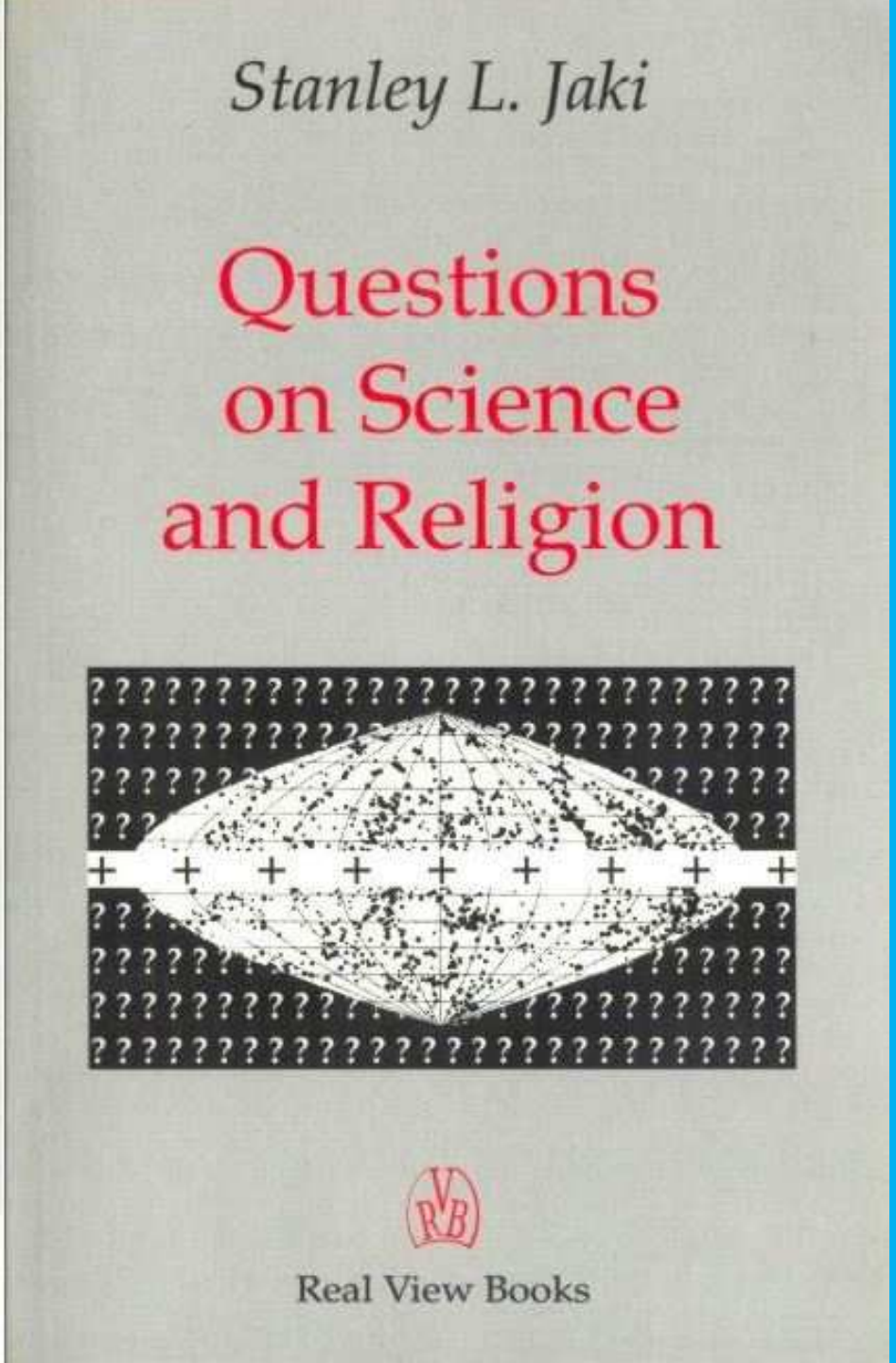
They (Muslims) say that the thing which exists with certain constant and permanent forms, dimensions, and properties, only follows the direction of habit, just as the king generally rides on horseback through the streets of the city, and is never found departing from this habit; but reason does not find it impossible that he should walk on foot through the place

-- Moses Maimonides, *The Guide for the Perplexed*

The Savior of Science

"If the Logos was fully divine, its creative work had to be the paragon of logic and order."

-- Stanley Jaki, *The Savior of Science*, p. 83



Questions on Science and Religion is a book that outlines well Stanley Jaki positions

It can be found on amazon.com or at:
http://www.realviewbooks.com

A site about Stanley Jaki:
http://www.sljaki.com

In memory of Pierre Duhem,
Illustrious professor of the University of Bordeaux,
Excelled by virtue no less than by learning,
Friend of the poor, model of the rich,
Wanted to assist rather than preside,
Loved truth more than friends,
Chastiser of errors, kind to those who err,
Had no enemies, except the enemies of truth,
Covered with merits, forgetful of himself,
Received renown, while fleeing honors,
Worthy of being crowned by Christ in heaven.