Desenvolvimento de Material Didático para o Ensino de Fisica

Antonio Carlos Fontes dos Santos

INSTITUTO DE FÍSICA
UNIVERSIDADE FEDERAL DO RIO DE JANEIRO
Pós-Graduação

A proa e a popa de nossa didática será investigar e descobrir o método segundo o qual os professores ensinem menos e os estudantes aprendam mais. Nas escolas haja menos trabalho inútil, menos enfado, menos barulho e, ao contrário, haja mais recolhimento, mais atrativo e mais sólido progresso.

Didacta Magna , Comenius

APERFEIÇOAR O ENSINO BÁSICO É TAREFA DE CIENTISTAS*

José Leite Lopes

`E os cientistas, os professores universitários, habituados a lutar por suas reivindicações específicas - mais verbas, mais equipamentos, melhores salários - esqueceram-se dos milhões de brasileiros sem acesso à educação básica e à cesta básica. Certamente, aos pesquisadores compete pesquisar. Mas estou convencido de que, na situação de guerra contra a falta de educação, **os cientistas devem debruçar-se, por algumas horas no mês, sobre o problema e contribuir com aulas e conferências nos estabelecimentos de educação básica para o aperfeiçoamento do ensino nesse nível**.`

** Escrito para o jornal O Tempo, Caderno Engenho e Arte, Belo Horizonte, jul., 1997.*

Divulgação

O átomo

Resumo:
A despeito de constituir tema de várias discussões no passado e presente, a grande maioria de nossos jovens ainda se ressentem de informações básicas sobre o que é energia nuclear e quais suas conseqüências nos diversos setores da sociedade.Baseada numa estória de Walt Disney, nessa palestra discutimos como a ciência atômica teve seu inicio, e como o conhecimento da energia nuclear brotou como conseqüência de muito esforço intelectual e físico de cientistas do passado que nos legaram o nosso conhecimento atual do átomo. A evolução dos modelos atômicos, desde 400 a.C. quando Leucippus apresenta o seu conceito da partícula indivisível até os modernos conceitos da física quântica, é apresentada de forma simples e com muitas ilustrações.Ênfase será dada aos riscos e benefícios da radiação. A nossa proposta é levar aos estudantes temas polêmicos tais como, irradiação de alimentos e usinas nucleares, mas também de suas aplicações em medicina e de como devemos usar de forma sábia este conhecimento.

Todo cientista tem que ir aonde o povo esta

Formação continuada de professores

- Curso de Atualização para Professores Regentes –
Programa Sucesso Escolar - UFRJ (2005)

- Curso de Programa de Melhoria e Expansão do Ensino Médio –
Física e Matemática (PROMED 2006)
Baixadas Litorâneas – Araruama - CIEP 253 Guimarães Rosa

O Programa Jovens Talentos

O Programa Jovens Talentos, de pré-iniciação científica, é destinado a estudantes do ensino médio/técnico da rede pública estadual de educação.

artigos em ensino

FEATURES

www.iop.org/journals/physed

Collision cross sections and the size of a coin

A C F Santos and A Fröhlich

Department of Physics, University of Missouri–Rolla, Rolla, MO 65401, USA

Abstract

An important question in education nowadays is how to convey some concepts of Modern Physics to students in high school, secondary education or the sixth form. This article presents an approach to atomic collisions suitable for intermediate level students. We describe an alternative way of measuring the area of a coin using a macroscopic analogy of the scattering of radiation by an atom or molecule—the collision cross section. We hope this article will help educators to illustrate such an important procedure and related concepts of Modern Physics.

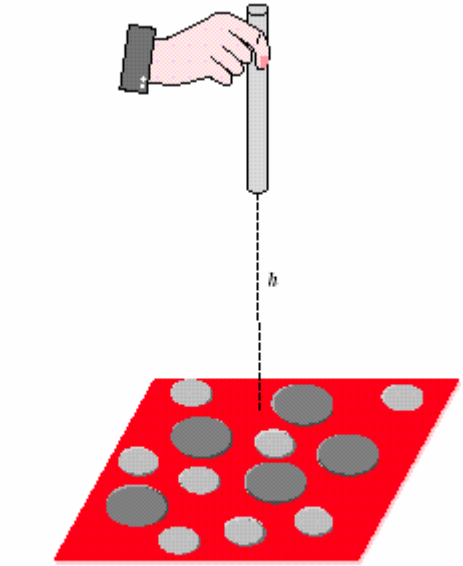


Figure 2. The projectile (grey cylinder) falls vertically from a height h onto a sheet of paper covered with coins.

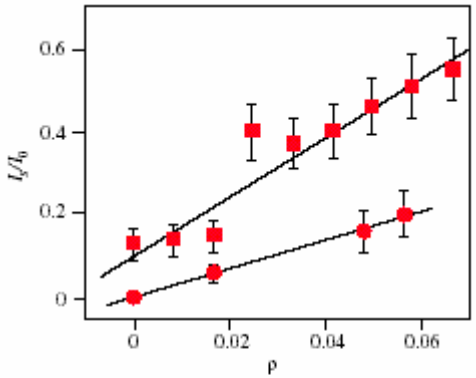


Figure 3. The growth method for pennies. Circles: the projectile is a sharp pencil and no background impurities were added. Squares: the projectile used was a pencil with dimensions comparable to the target dimensions. In order to simulate the impurities present in the background, six American quarters were used.

FEATURES
www.iop.org/journals/physed

Teaching electromagnetism to high-school students using particle accelerators

D A Sinflorio[1], P Fonseca[2], L F S Coelho[2] and A C F Santos[2]

Palestra convidada no CAARI - 20th International Conference on the Application of Accelerators in Research and Industry – Forth Worth Texas (2008)

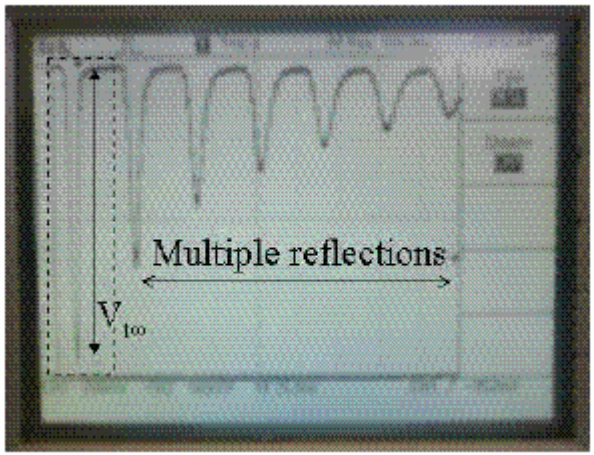
Figure 2. The 1.7 MV accelerator.

Revista Brasileira de Ensino de Física, v. 29, n. 3, p. 373-375, (2007)
www.sbfisica.org.br

A very simple way to measure coaxial cable impedance

(Um modo simples para medir a impedância de um cabo coaxial)

P. Fonseca, A.C.F. Santos[1] and E.C. Montenegro



$1 \quad 2 \quad 2R$

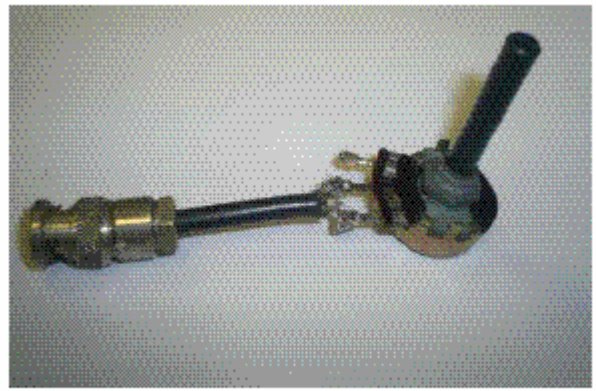


Figure 3 - A potentiometer of 1 kΩ used in shunt with the oscilloscope.

IOP Publishing
European Journal of Physics
Eur. J. Phys. 29 (2008) 251–256
doi:10.1088/0143-0807/29/2/007

Studying charged particle optics: an undergraduate course

V Ovalle[1], D R Otomar[1], J M Pereira[2], N Ferreira[1], R R Pinho[3] and A C F Santos[2,4]

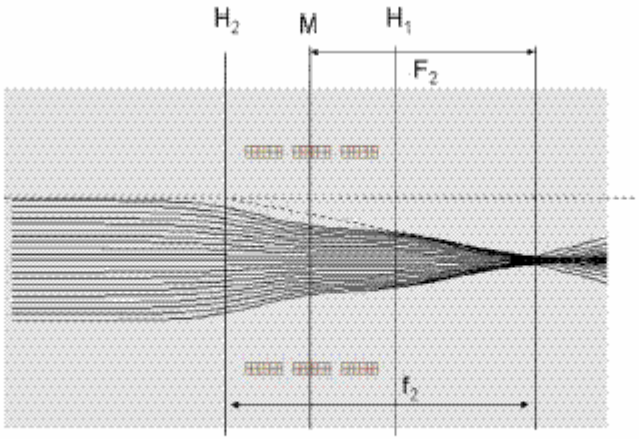


Figure 1. A parallel beam of electrons being focused by a symmetric three-element lens. The figure shows some of the lens parameters (see text for details).

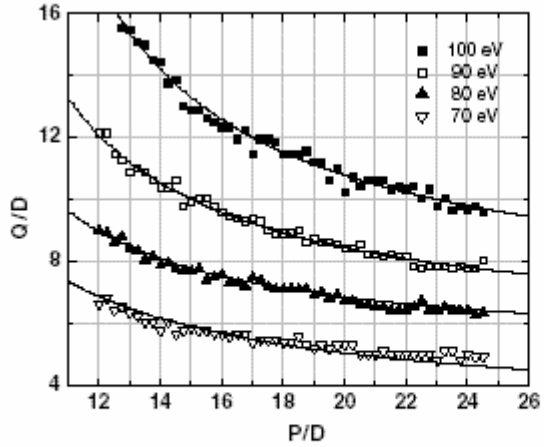


Figure 3. *P–Q* curves for a three-cylinder symmetrical lens for different electron energies. The full lines represent plots of equation (2).

E-mail recebido 24/03/08

Dear Dr Santos,

I am pleased to tell you that your article, "Studying charged particle optics: an undergraduate course", in European Journal of Physics, Vol 29, pp251 (2008), has been downloaded 250 times so far.

To put this into context, across all IOP journals 10% of articles were accessed over 250 times this quarter.

Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
Nuclear Instruments and Methods in Physics Research B xxx (2007) xxx–xxx
NIM B
Beam Interactions with Materials & Atoms
www.elsevier.com/locate/nimb

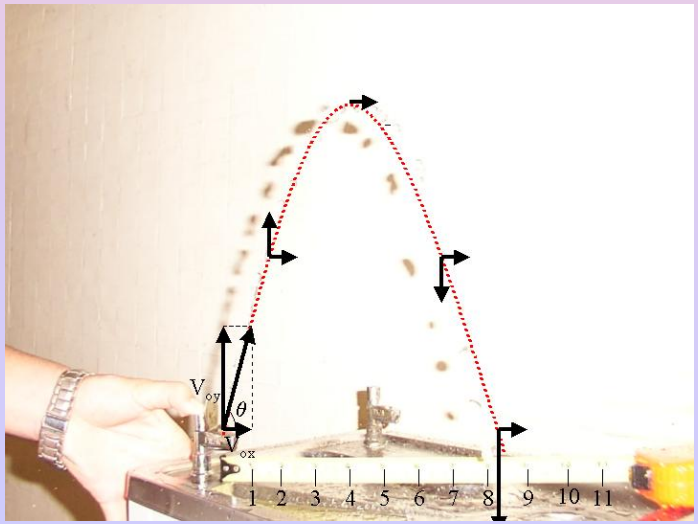
An undergraduate course in experimental atomic and molecular physics using an accelerator

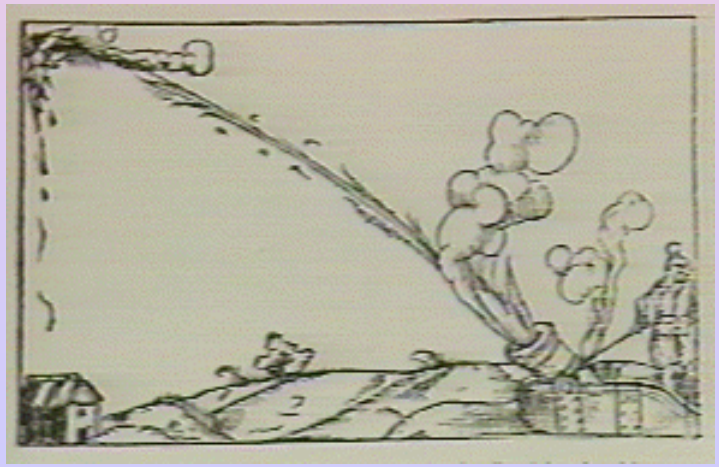
A.C.F. Santos *, S.D. Magalhães, N.V. de Castro Faria

Cellular phones helping to get a clearer picture of Kinematics

A. E. G. Falcão Jr.[1], R. A. Gomes[2], J. M. Pereira[3], L.F. S Coelho[3], A. C. F. Santos[3*]

Aceito The Physics Teacher (2009)





Projetos a desenvolver

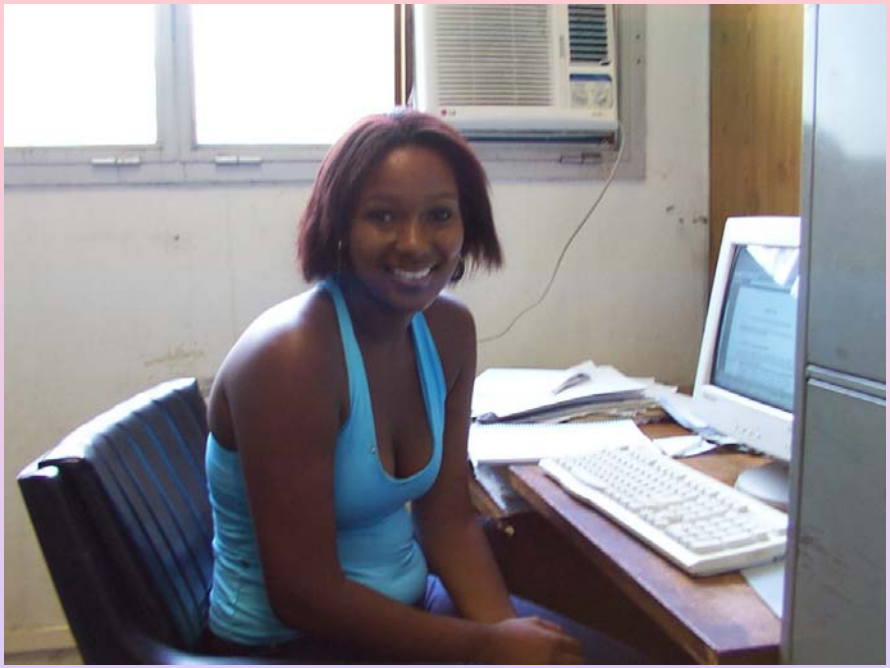
Ensino de simetrias no ensino médio

Interação da Radiação com a Matéria ou por que o homem Invisível é cego ?

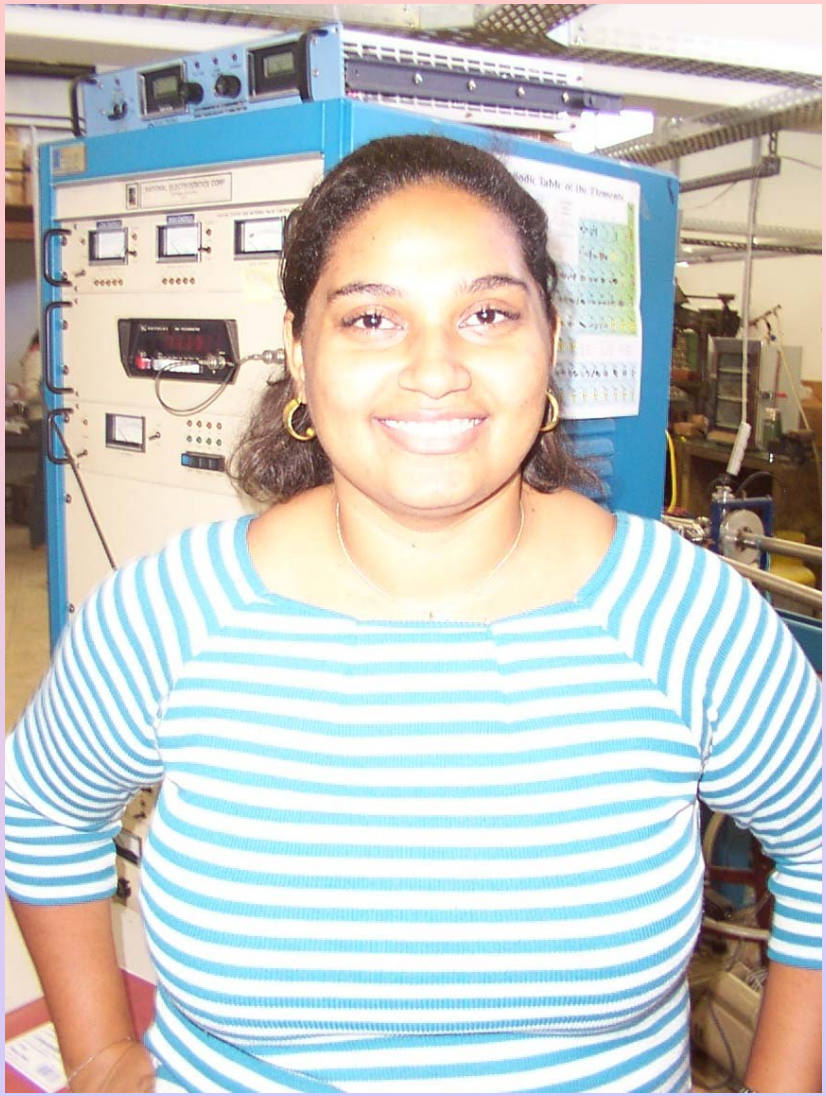
Desenvolvimento de um sistema Eletrônico de Votação para uso em sala de aula

….

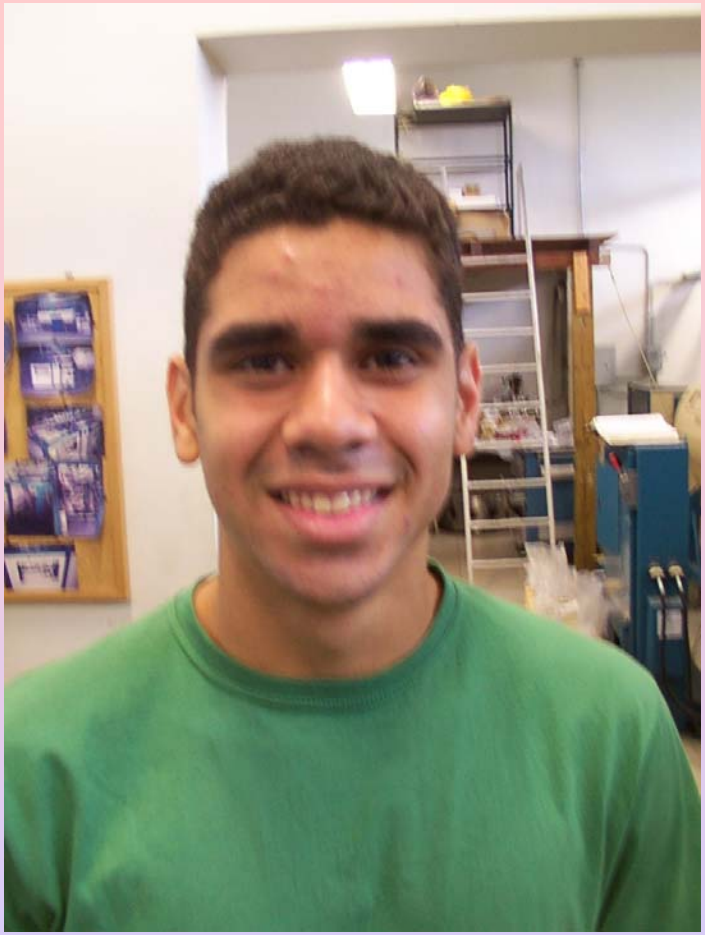
A equipe



Débora Sinflório (Instituto Superior de Educacao do Rio de Janeiro)
Bolsista Jovens Talentos (FAPERJ)



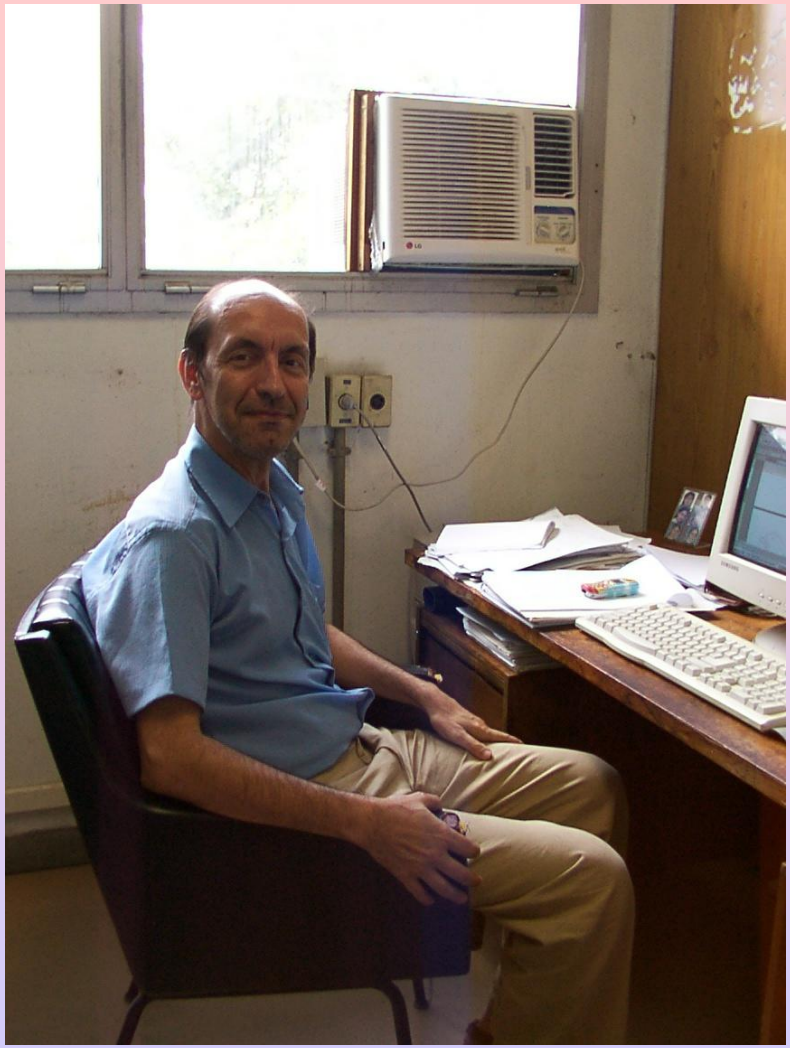
Juliana Menezes – IF-UFRJ
Iniciação Cientifica



Rafael Gomes
Bolsista Jovens Talentos- FAPERJ
Colegio Pedro Alvares Cabral - Copacabana

Paulo Fonseca (IF-UFRJ)
Iniciação Cientifica
Bolsista PIBIC

Arthur Falcão
Bolsista Jovens Talentos – FAPERJ
Colégio Pedro Álvares Cabral – S. J. Meriti



Luis Felipe Coelho
Professor Associado – IF- UFRJ

NEWTON'S THREE LAWS OF GRADUATION

Though famous for his seminal work in Mechanics, Isaac Newton's theories on the prediction of a doctoral graduation formulated while still a grad student at Cambridge remain his most important contribution to academia.

FIRST LAW

"A grad student in procrastination tends to stay in procrastination unless an external force is applied to it"

This postulate is known as the "***Law of Inertia***" and was originally discovered experimentally by Galileo four years before Newton was born when he threatened to cut his grad student's funding. This resulted in a quickening of the student's research progress.

Galileo's observations were later perfected by Descartes through the application of "Weekly Meetings."

Before Galileo's time, it was wrongfully thought that grad students would rest only as long as no work was required of them and that in the absence of external forces, they would graduate by themselves.

(From Encyclopaedia Britannica)

PHD.STANFORD.EDU

JORGE CHAM ©THE STANFORD DAILY

NEWTON'S THREE LAWS OF GRADUATION

First published in 1679, Isaac Newton's "***Procrastinare Unnaturalis Principia Mathematica***" is often considered one of the most important single works in the history of science. Its Second Law is the most powerful of the three, allowing mathematical calculation of the duration of a doctoral degree.

SECOND LAW

"The age, a, of a doctoral process is directly proportional to the flexibility, f, given by the advisor and inversely proportional to the student's motivation, m"

Mathematically, this postulate translates to:

$$age_{PhD} = \frac{flexibility}{motivation}$$

$$a = F / m$$

$$\therefore F = m\,a$$

This Law is a quantitative description of the effect of the forces experienced by a grad student. A highly motivated student may still remain in grad school given enough flexibility. As motivation goes to zero, the duration of the PhD goes to infinity.

PHD.STANFORD.EDU

JORGE CHAM ©THE STANFORD DAILY

NEWTON'S THREE LAWS OF GRADUATION

Having postulated the first two Laws of Graduation, Isaac Newton the grad student was still perplexed by this paradox: If indeed the first two Laws accounted for the forces which delayed graduation, why doesn't explicit awareness of these forces allow a grad student to graduate?

It is believed that Newton practically abandoned his graduate research in Celestial Mechanics to pursue this paradox and develop his Third Law.

THIRD LAW

"For every action towards graduation there is an equal and opposite distraction"

This Law states that, regardless of the nature of the interaction with the advisor, every force for productivity acting on a grad student is accompanied by an equal and opposing useless activity such that the net advancement in thesis progress is zero.

Newton's Laws of Graduation were ultimately shown to be an approximation of the more complete description of Graduation Mechanics given by Einstein's Special Theory of Research Inactivity.

Einstein's theory, developed during his graduate work in Zurich, explains the general phenomena that, relative to the grad student, time slows down to nearly a standstill.

PHD.STANFORD.EDU

JORGE CHAM ©THE STANFORD DAILY

Obrigado!