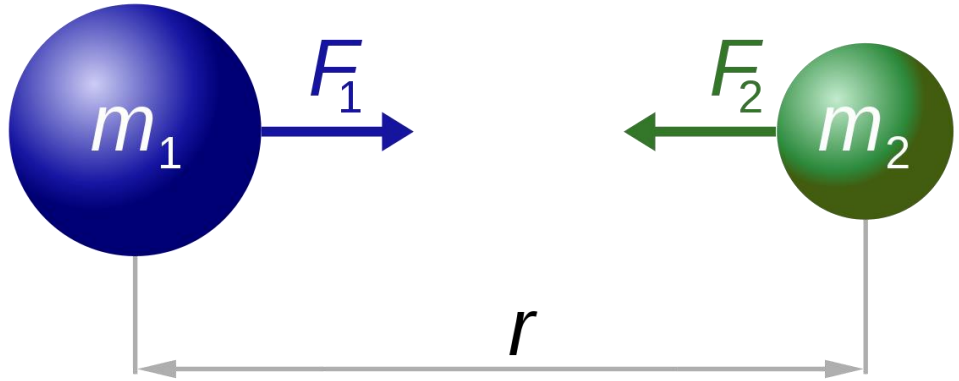
https://youtu.be/vq0EoPcWWmE

4 – A LEI DA GRAVIDADE

17 EQUAÇÕES QUE MUDARAM O MUNDO – OUTSPOKEN MARKET NA PRÁTICA – LEANDRO GUERRA

OUTSPOKEN MARKET
NA PRÁTICA



$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

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OUTSPOKEN MARKET NA PRÁTICA

17 Equations That Changed the World
by Ian Stewart

1.	**Pythagoras's Theorem**	$a^2 + b^2 = c^2$	Pythagoras,530 BC
2.	**Logarithms**	$\log xy = \log x + \log y$	John Napier, 1610
3.	**Calculus**	$\frac{\mathrm{d}f}{\mathrm{d}t} = \lim_{h \to 0} \frac{f(t+h) - f(t)}{h}$	Newton, 1668
4.	**Law of Gravity**	$F = G\frac{m_1 m_2}{r^2}$	Newton, 1687
5.	**The Square Root of Minus One**	$i^2 = -1$	Euler, 1750
6.	**Euler's Formula for Polyhedra**	$V - E + F = 2$	Euler, 1751
7.	**Normal Distribution**	$\Phi(x) = \frac{1}{\sqrt{2\pi\rho}} e^{\frac{(x-\mu)^2}{2\rho^2}}$	C.F. Gauss, 1810
8.	**Wave Equation**	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	J. d'Almbert, 1746
9.	**Fourier Transform**	$f(\omega) = \int_{\infty}^{\infty} f(x) e^{-2\pi i x \omega} \mathrm{d}\,x$	J. Fourier, 1822
10.	**Navier-Stokes Equation**	$\rho\left(\frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v}\right) = -\nabla p + \nabla \cdot \mathbf{T} + \mathbf{f}$	C. Navier, G. Stokes, 1845
11.	**Maxwell's Equations**	$\nabla \cdot \mathbf{E} = \frac{\rho}{\varepsilon_0}$ $\quad \nabla \cdot \mathbf{H} = 0$ $\nabla \times \mathbf{E} = -\frac{1}{c}\frac{\partial \mathbf{H}}{\partial t}$ $\quad \nabla \times \mathbf{H} = \frac{1}{c}\frac{\partial E}{\partial t}$	J.C. Maxwell, 1865
12.	**Second Law of Thermodynamics**	$\mathrm{d}S \geq 0$	L. Boltzmann, 1874
13.	**Relativity**	$E = mc^2$	Einstein, 1905
14.	**Schrodinger's Equation**	$i\hbar\frac{\partial}{\partial t}\Psi = H\Psi$	E. Schrodinger, 1927
15.	**Information Theory**	$H = -\sum p(x) \log p(x)$	C. Shannon, 1949
16.	**Chaos Theory**	$x_{t+1} = kx_t(1 - x_t)$	Robert May, 1975
17.	**Black-Scholes Equation**	$\frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS\frac{\partial V}{\partial S} + \frac{\partial V}{\partial t} - rV = 0$	F. Black, M. Scholes, 1990

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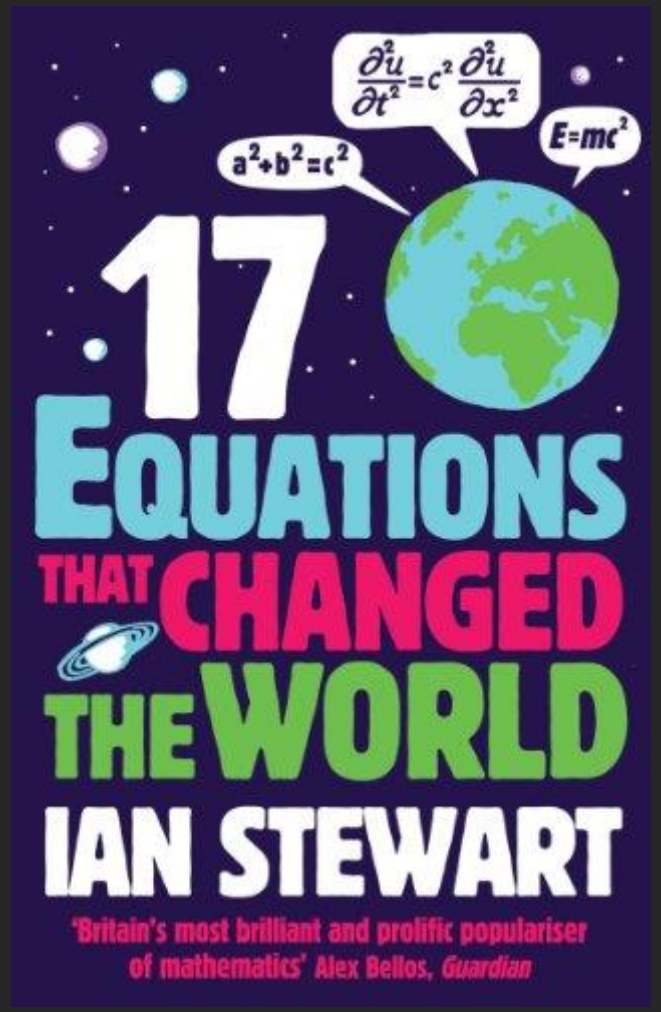
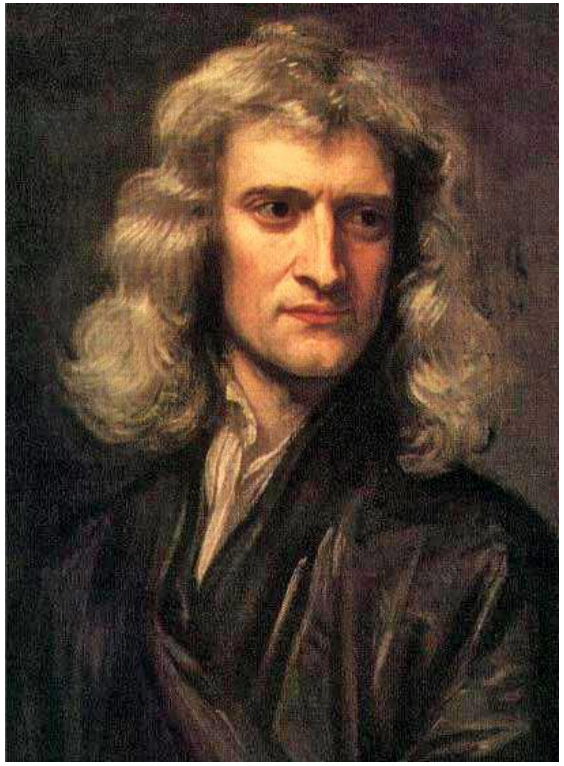

$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$
$E=mc^2$
$a^2+b^2=c^2$
17
EQUATIONS
THAT CHANGED
THE WORLD
IAN STEWART
'Britain's most brilliant and prolific populariser of mathematics' Alex Bellos, Guardian

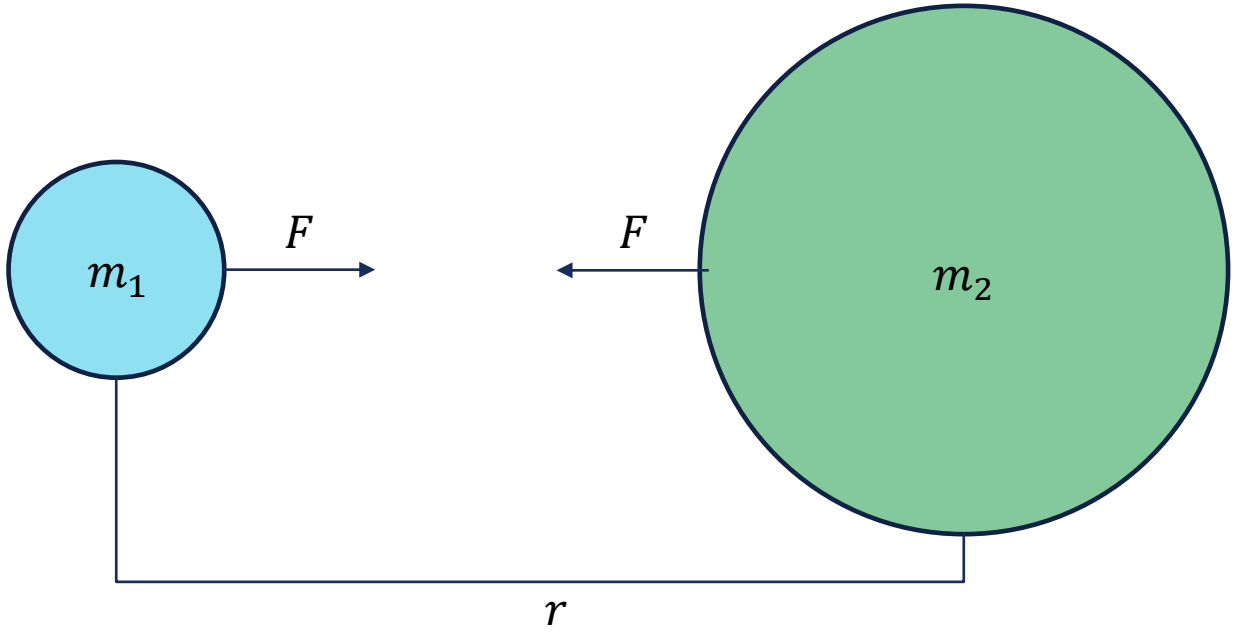
ISAAC NEWTON



Isaac Newton
(1642 -1726)

A FORÇA GRAVITACIONAL

$$F = G\frac{m_1 m_2}{r^2}$$



A teoria geral da relatividade de Einstein suplantou a lei geral da gravidade de Newton

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POR QUE ELA É IMPORTANTE?

Mantém o sistema solar coeso

Mantém a nossa atmosfera por perto

Ajuda no fluxo da água nos rios e na precipitação de chuvas e neve.

órbita da Lua e marés.

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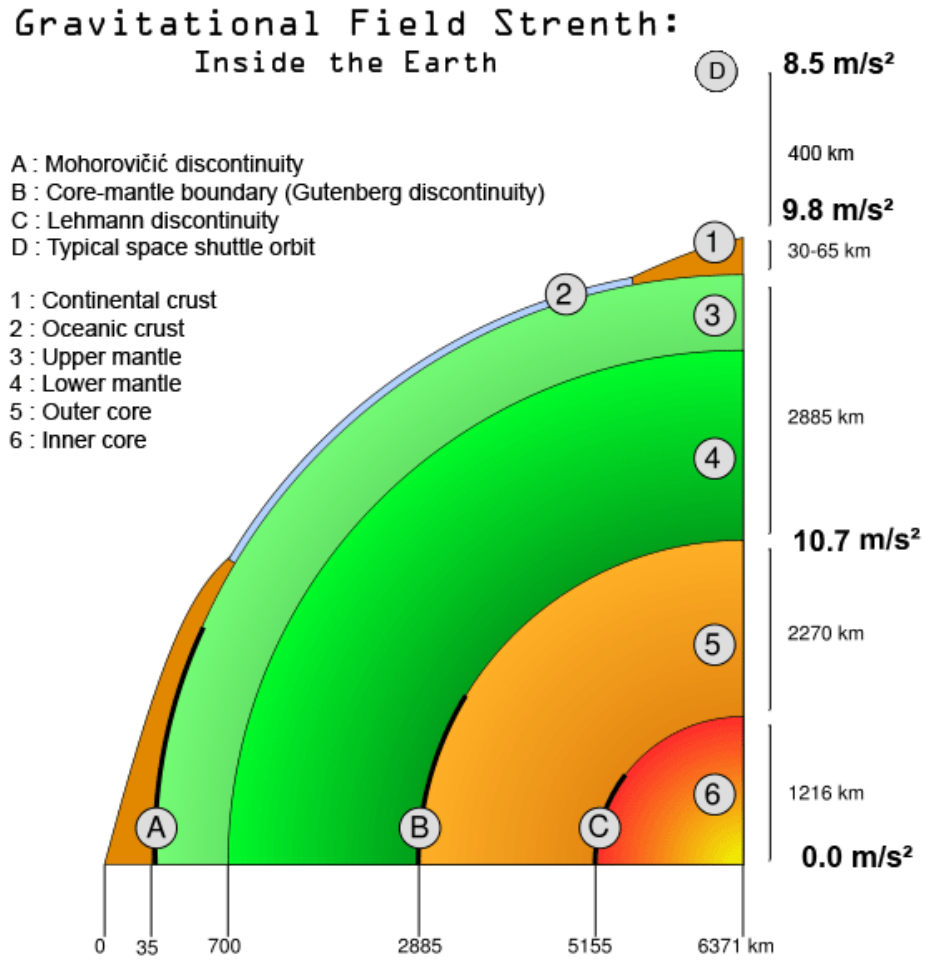
UMA OBSERVAÇÃO



A força da gravidade esta sempre represente e é relativamente fraca quando comparada à outras forças.

Entretanto sua presença é notável quando tratamos de objetos com massas elevadas como os planetas ou outros corpos celestes.

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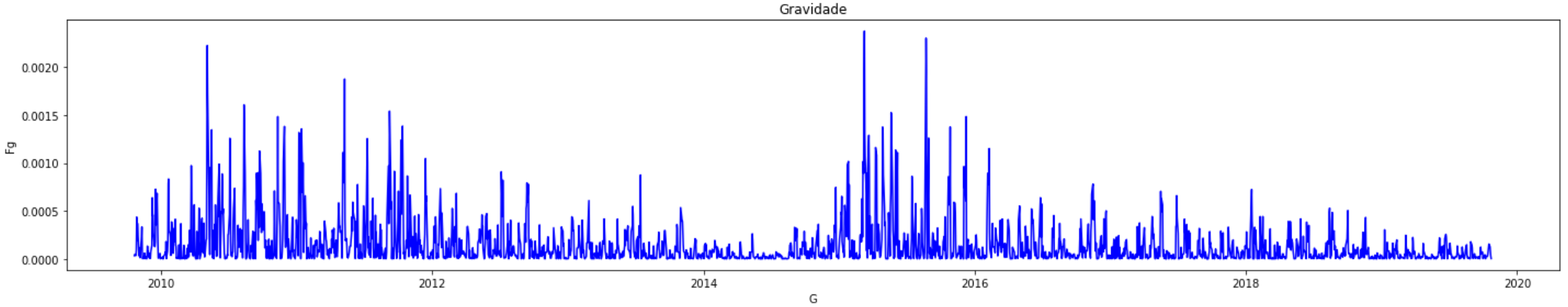
APLICAÇÕES DA LEI DA GRAVIDADE

Variáveis preditivas em modelos do mercado financeiro



$$F = G\frac{m_1 m_2}{r^2}$$

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APLICAÇÕES DA LEI DA GRAVIDADE

Cálculo razoavelmente aproximado da massa de objetos, como exemplo a massa da terra

$$F = G\frac{m_1 m_2}{r^2}$$

$$9{,}8 = 6{,}67 * 10^{-11}\frac{1m_2}{6371000^2}$$

$$9{,}8 * 4{,}06 * 10^{13} = 6{,}67 * 10^{-11}m_2$$

$$9{,}8 * 4{,}06 * 10^{3} * \frac{1}{6{,}67} * 10^{11} = m_2$$

$$m_2 = 5.960.000.000.000.000.000.000$$

$$m_2 = 5{,}96 * 10^{24}kg$$

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OBRIGADO E ATÉ A PRÓXIMA!

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