

# الفيزياء الحديثة في خدمة علم الفلك

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(1727-1643)

-1629) (Huygens)

(Galileo)

(Newton)

Principia

(1695)

.1

$$mv = const$$

$v$

$m$

$v \neq 0$

$v = 0$

$mv$

.2

$$mw = F \quad \frac{d}{dt}(mv) = F$$

.3

$$F_1 = -F_2 \quad \frac{d}{dt}(m_1v_1) = -\frac{d}{dt}(m_2v_2)$$

$$F = f \frac{m_1m_2}{r^2}$$

:  $f$

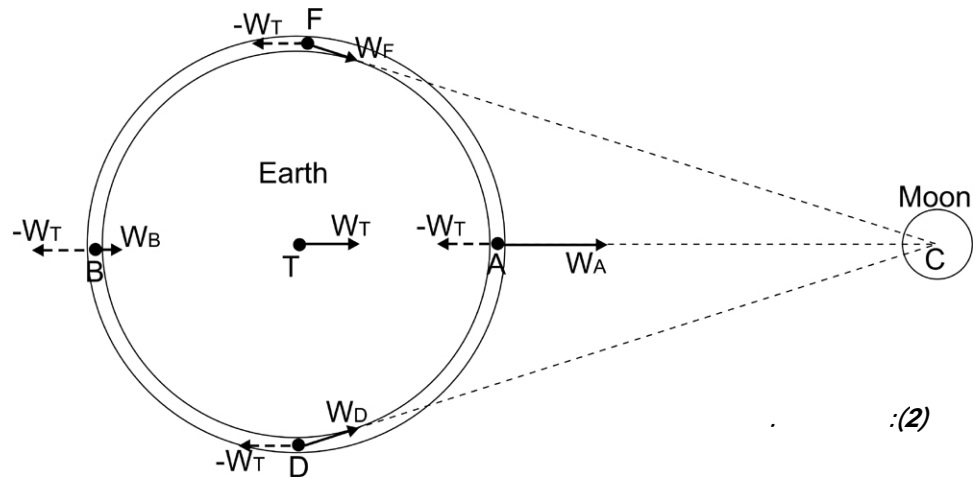
:  $r$

:  $m_1, m_2$

:S

$$f = 6.67 \cdot 10^{-11} \frac{m^3}{kg \cdot s^2}$$





(2)

$$r \quad m : \quad W_T = f \frac{m}{r^2}$$

B  $W_T$  A

$$R \quad W_B = f \frac{m}{(r+R)^2} \quad W_A = f \frac{m}{(r-R)^2}$$

:  $W_A - W_T$  A ( )

$$W_A - W_T = fm \left[ \frac{1}{(r-R)^2} - \frac{1}{r^2} \right] = fm \frac{2rR - R^2}{(r-R)^2 r^2}$$

R  $R^2$  R

$$W_A - W_T = fm \frac{2R}{r^3}$$

B

$$W_A > W_T$$

$$W_B < W_T$$

A

F D

2.2

( )

Morley Michelson

26

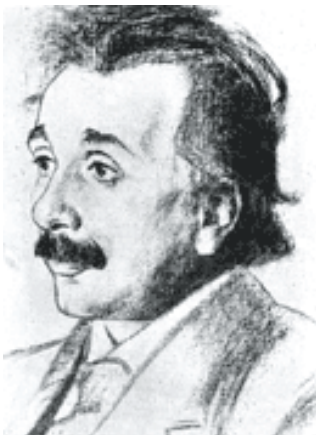
1905

Lorenz

(Einstein)

(3)

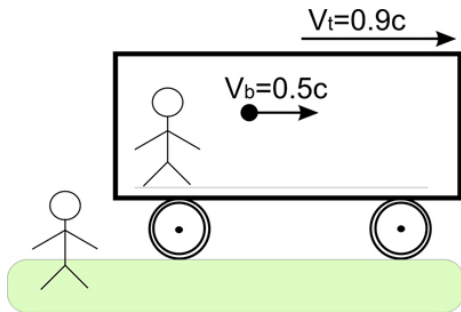
0.9



(1879-1955)

1.4 :

29/28



:(3)

$E = mc^2$  :

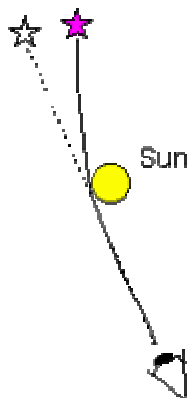
1915

1919

Eddington

.(4)

1.75



:(4)

8

0.6

10

0.6

( )

0.6

:

10

1.2

17/15

0.6 ) 4  
4 17/15 .(  
! 8 10  
(Theory of Everything) (Hocking)