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Phys111 Report

Experiment #2: Conservation of Linear Momentum

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(1) Abstract:

Aim of the experiment:

To prove the law of conservation of linear momentum by calculation R .

The main result is:

$$R = 1.00 \pm 0.02$$

(2) Data:

	$m_1 = 16.5 \pm 0.05 \text{ g}$			$m_2 = 4.7 \pm 0.05 \text{ g}$			
	1	2	3	4	5	6	7
$x_{1b} \text{ (cm)}$	48.2	47.1	46.8	47.5	46.5	46.2	46.9
$x_{1a} \text{ (cm)}$	26.9	25.2	27	26.7	26.6	27.7	27.5
$x_{2a} \text{ (cm)}$	71.0	69.8	71.4	72.1	69.8	69.5	71.3

(3) Calculations:

$\bar{x}_{1b} = 46,91$	$\sigma_s(x_{1b}) = 0,77$	$\Delta\bar{x}_{1b} = 0,29$
$\bar{x}_{1a} = 26,80$	$\sigma_s(x_{1a}) = 0,81$	$\Delta\bar{x}_{1a} = 0,30$
$\bar{x}_{2a} = 70,70$	$\sigma_s(x_{2a}) = 0,10$	$\Delta\bar{x}_{2a} = 0,37$

$$A = m_1 x_{1a} + m_2 x_{2a} = (16,5 \times 26,80) + (4,7 \times 70,70) = 774,50$$

$$\Delta A = m_1 \Delta x_{1a} + \Delta m_1 x_{1a} + m_2 \Delta x_{2a} + \Delta m_2 x_{2a} = 11,56$$

$$B = m_1 x_{1b} = 16,5 \times 46,91 = 774,015$$

$$\Delta B = m_1 \Delta x_{1b} + \Delta m_1 x_{1b} = 7,130$$

$$R = \frac{A}{B} = \frac{774,50}{774,015} = 1,0006$$

$$\frac{\Delta R}{R} = \frac{\Delta A}{A} + \frac{\Delta B}{B} = \frac{11,56}{774,50} + \frac{7,130}{774,015} = 0,024$$

$$\Delta R = 0,024 \times 1,0006 = 0,0240$$

units!!

(4) Results:

$$R = 1,00 \pm 0,02$$

(5) Conclusions:

The ratio of (R) that got is (1,00) with an expected error of 0,02 by using the discrepancy test

$$| \text{my value} - \text{true value} | \rightarrow | 1,00 - 1 | = 0 \leq 2 \times \text{error}$$

$$\rightarrow 0 \leq 2 \times 0,02 \rightarrow 0 \leq 0,04 \rightarrow \text{My result is accepted.}$$

- My experimental value nearly agrees with the true value.

it doesn't exactly the same because in this experiment many errors can be occurred.