Exercises for Experimental Physics 1 – IPSP

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Exercise Sheet 1 (WS 2011/12)

Oct. 18th 2011

Exercises:

1. Which of the following is not one of the base quantities in the SI system? (a) mass, (b) length, (c) energy, (d) time, (e) All of the above are base quantities.

2. Force has dimensions of mass times acceleration. Acceleration has dimensions of speed divided by time. Pressure is defined as force divided by area. What are the dimensions of pressure? Express pressure in terms of the SI base units kilogram, meter and second.

3. Is it possible for three equal magnitude vectors to add to zero? If so, sketch a graphical answer. If not, explain why not.

4. In 1989, IBM scientists figured out how to move atoms with a scanning tunneling microscope (STM). One of the first STM pictures seen by the general public was of the letters IBM spelled with xenon atoms on a nickel surface. The letters IBM were 15 xenon atoms across. If the space between the centers of adjacent xenon atoms is 5 nm ($5 \cdot 10^{-9}$ m), estimate how many times could "IBM" could be written across this 8.5 inch page.

5. In the following, x is in meters, t is in seconds, v is in meters per second, and the acceleration a is in meters per second squared. Find the SI units of each combination: (a) $\frac{v^2}{x}$, (b) $\sqrt{\frac{x}{a}}$, (c) $\frac{1}{2}at^2$.