

A level Physics B

H557/01 Fundamentals of physics

Question Set 26

1 (a)

This question is about the electric field around protons.

Two protons are separated by $1.0 \times 10^{-9} \text{ m}$ as shown in **Fig. 1.1**. Point **X** is equidistant from each proton as shown.

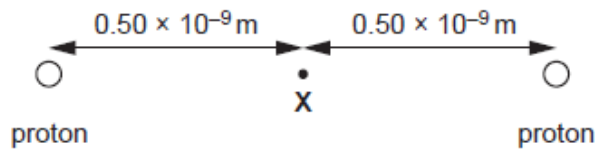


Fig.1.1 not to scale

(i) Explain why the electric field strength at **X** is zero.

[1]

(ii) Calculate the electric potential at **X**.

potential =V

[2]

(b) Imagine a third proton is positioned as shown in **Fig. 1.2**.

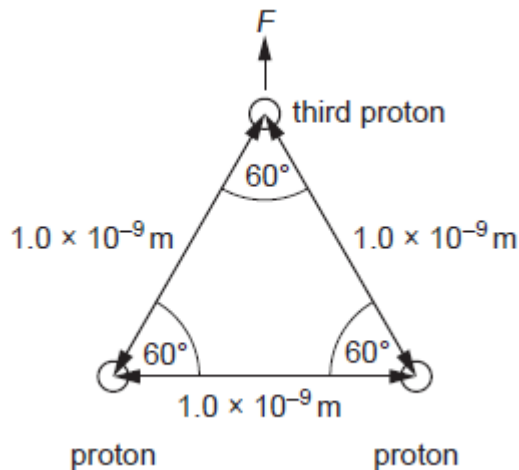


Fig. 1.2 not to scale

(i) Show that the resultant force F on the third proton is about $4 \times 10^{-10} \text{ N}$ in the direction shown. Explain your reasoning. You may include a diagram in your answer.

[4]

(ii) The separation of protons in a lithium ${}^6\text{Li}$ nucleus is of the order of 10^{-15} m . Estimate the magnitude of the resultant electric force on a proton in the nucleus if the protons are arranged symmetrically as in **Fig. 1.2**.

force =N

[2]

Total Marks for Question Set: 9

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