

Study of Fast Negative Ions in Superfluid Helium-4

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We will report measurements of the mobility of negative ions (electron bubbles) in superfluid helium in the temperature range 0.95 to 1.15 K. The mobility is measured by the time-of-flight method and the ions are produced by means of an electrical discharge in the vapor above the liquid surface. In addition to the highly-studied normal negative ion consisting of an electron trapped in a cavity of diameter about 40 Å we detect other negative ions of mobility approximately 7 times higher. These fast ions have been detected previously but to this date there is no understanding of their physical nature. We will discuss how the number of these objects varies with the experimental conditions.