

Homework Assignment for Bulk Monte Carlo Lab: Velocity vs. Field for Arbitrary Crystallographic Orientations

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The figure below is from the paper:

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On High-Electric-Field Conductivity in *n*-Type Silicon†

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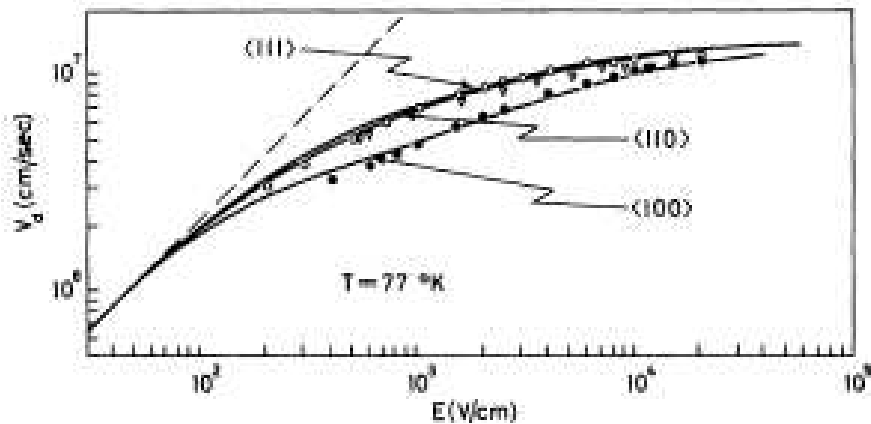


FIG. 1. Electron drift velocity v_d vs applied electric field E at 77 °K for different crystallographic directions in Si. Experimental values of Canali *et al.* (Ref. 12): \circ for $E \parallel \langle 111 \rangle$, ∇ for $E \parallel \langle 110 \rangle$, \bullet for $E \parallel \langle 100 \rangle$.

- Use the Bulk Monte Carlo Lab to reproduce the experimental velocity field characteristics shown in this figure. Comment on the agreement between simulation and experiment.
- Generate the same plot for $T = 300\text{K}$ and comment on the results obtained.

Note: Given the electric field strength the average drift velocity along the field and the mobility of the carriers are printed in the output log.