

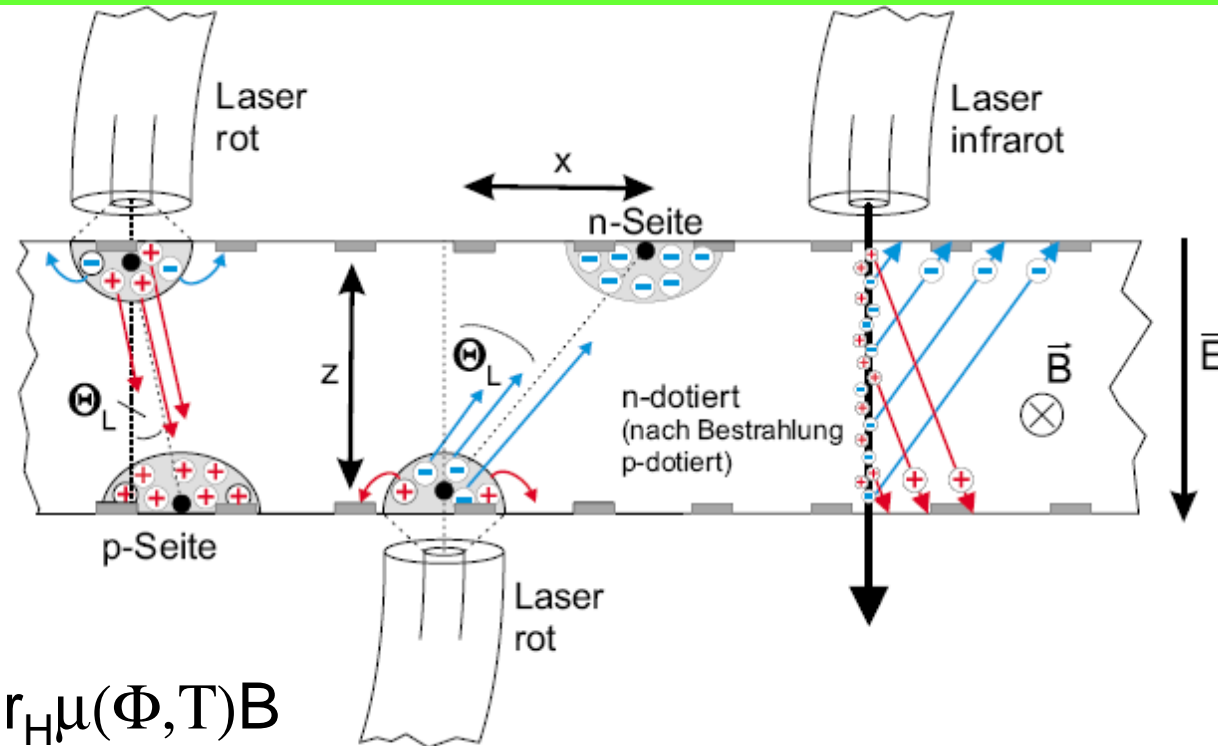
Measurements of Lorentz angle in irradiated silicon strip sensors

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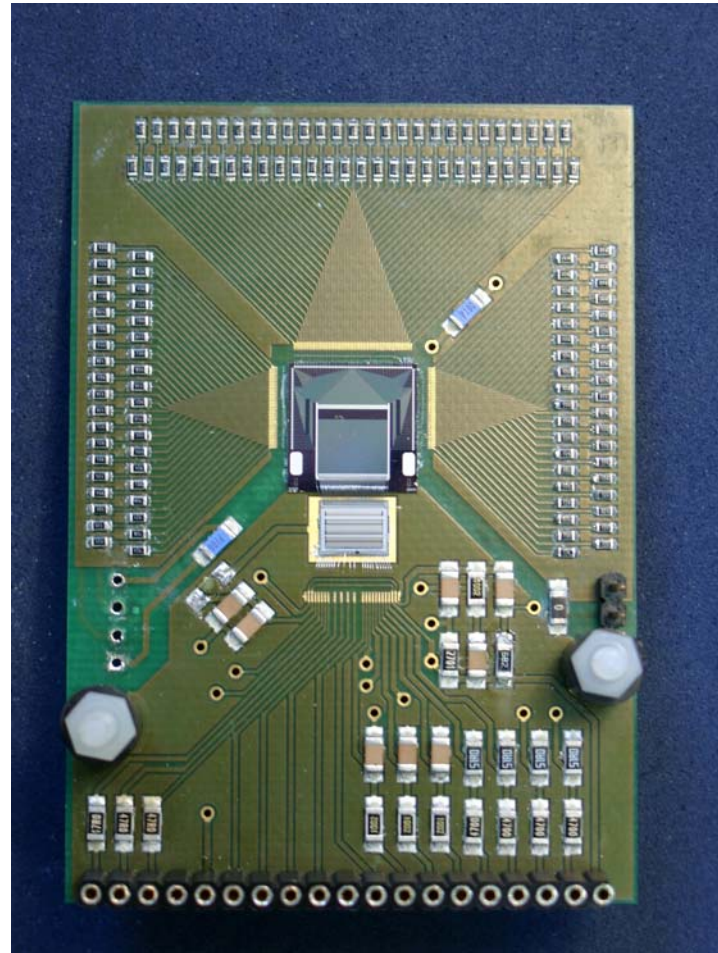


principle of measurement



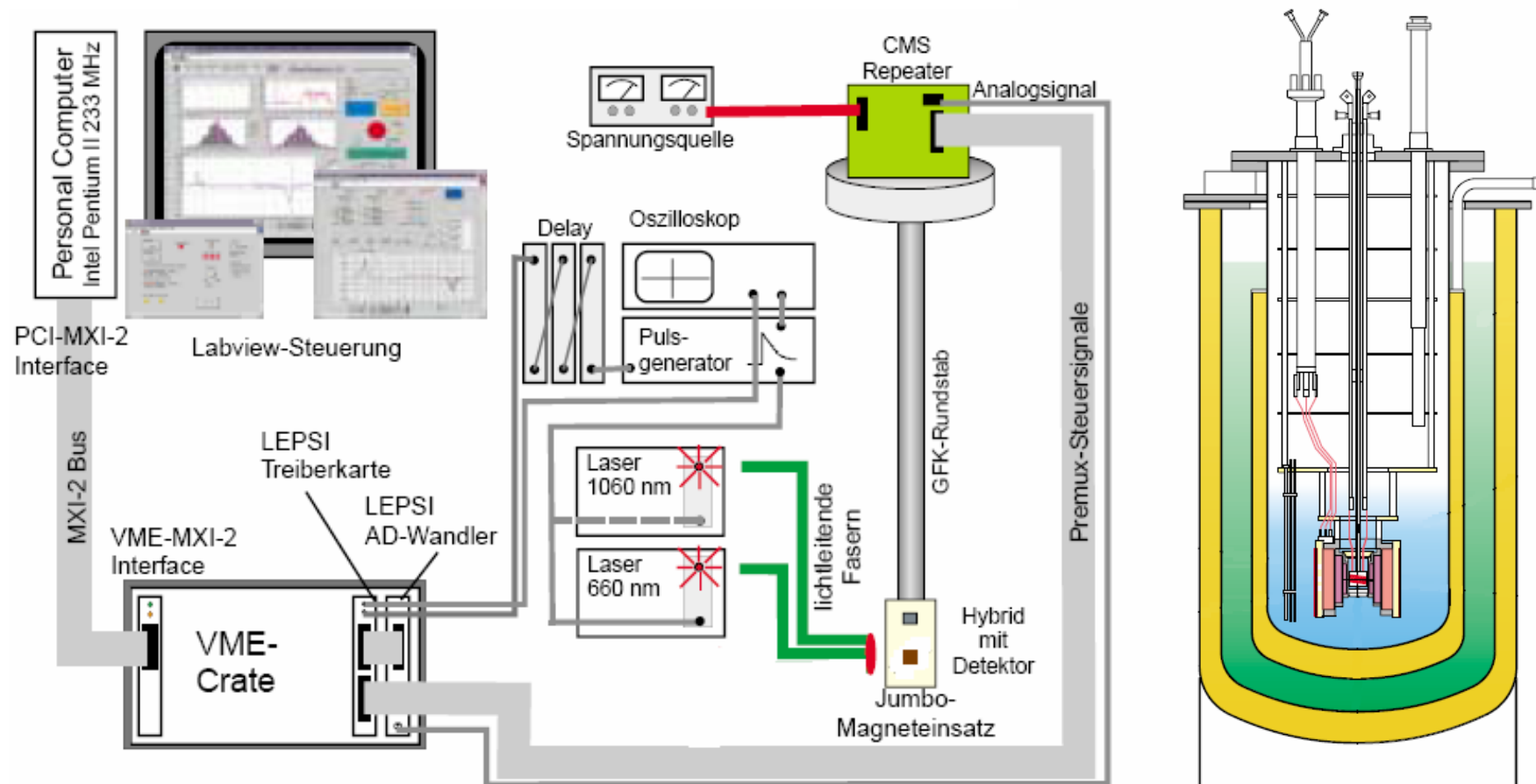
- $\tan\theta = r_H \mu(\Phi, T) B$
- charge carriers are produced at a strip
- Lateral drift in magnetic field is measured
- Lorentz angle is calculated

Hybrid with strip sensor

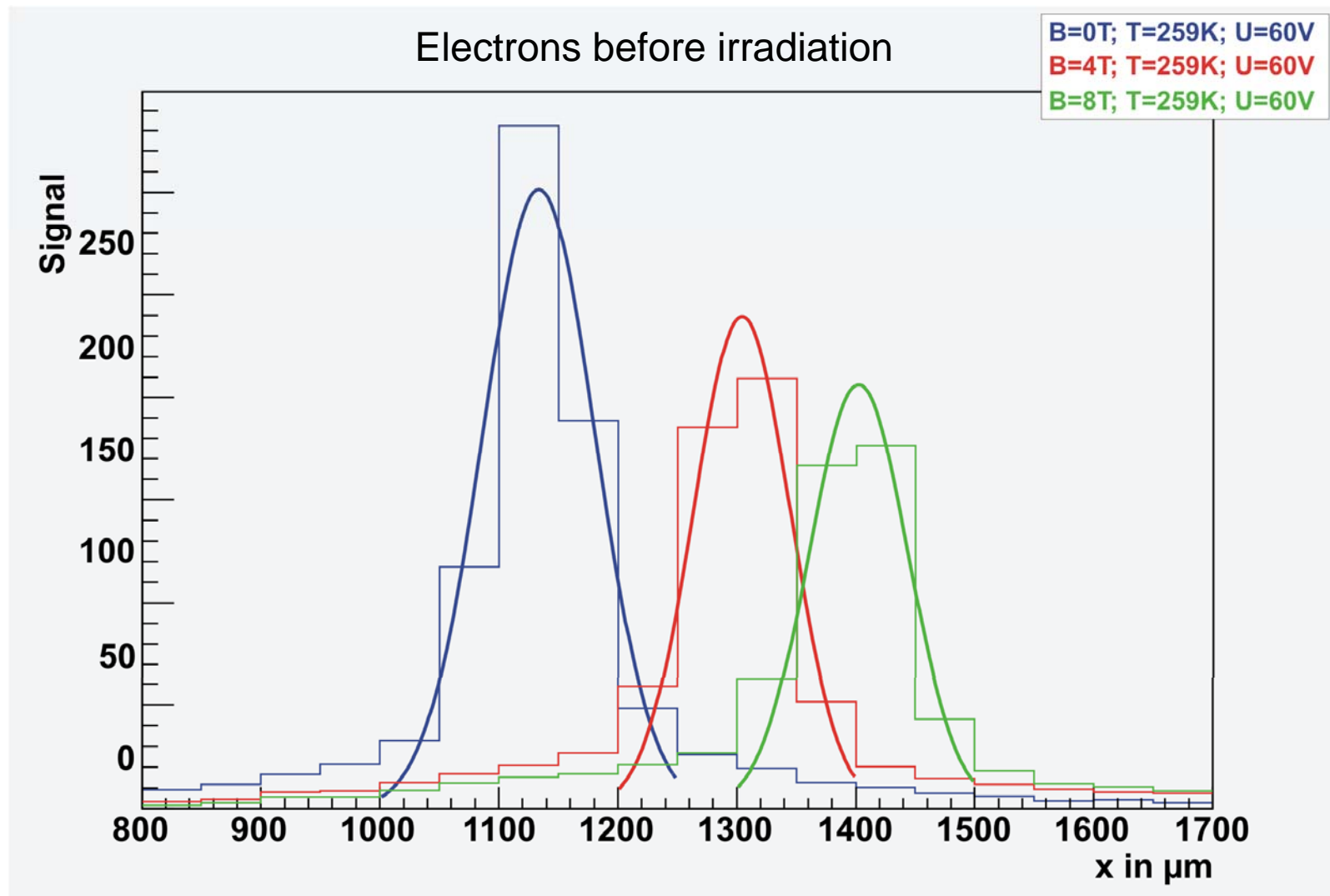


- double sided sensor ($\sim 1\text{cm}^2$), $50\mu\text{m}$ pitch, $300\mu\text{m}$ thickness, strips on both sides parallel (former sensors had stripes crossed)
- bias resistors ($10\text{M}\Omega$) on hybrid
- Premux128 Chip for data recording
- irradiated with 26MeV protons
- $\Phi=6 \times 10^{13}$ and $\Phi=1,2 \times 10^{14}$

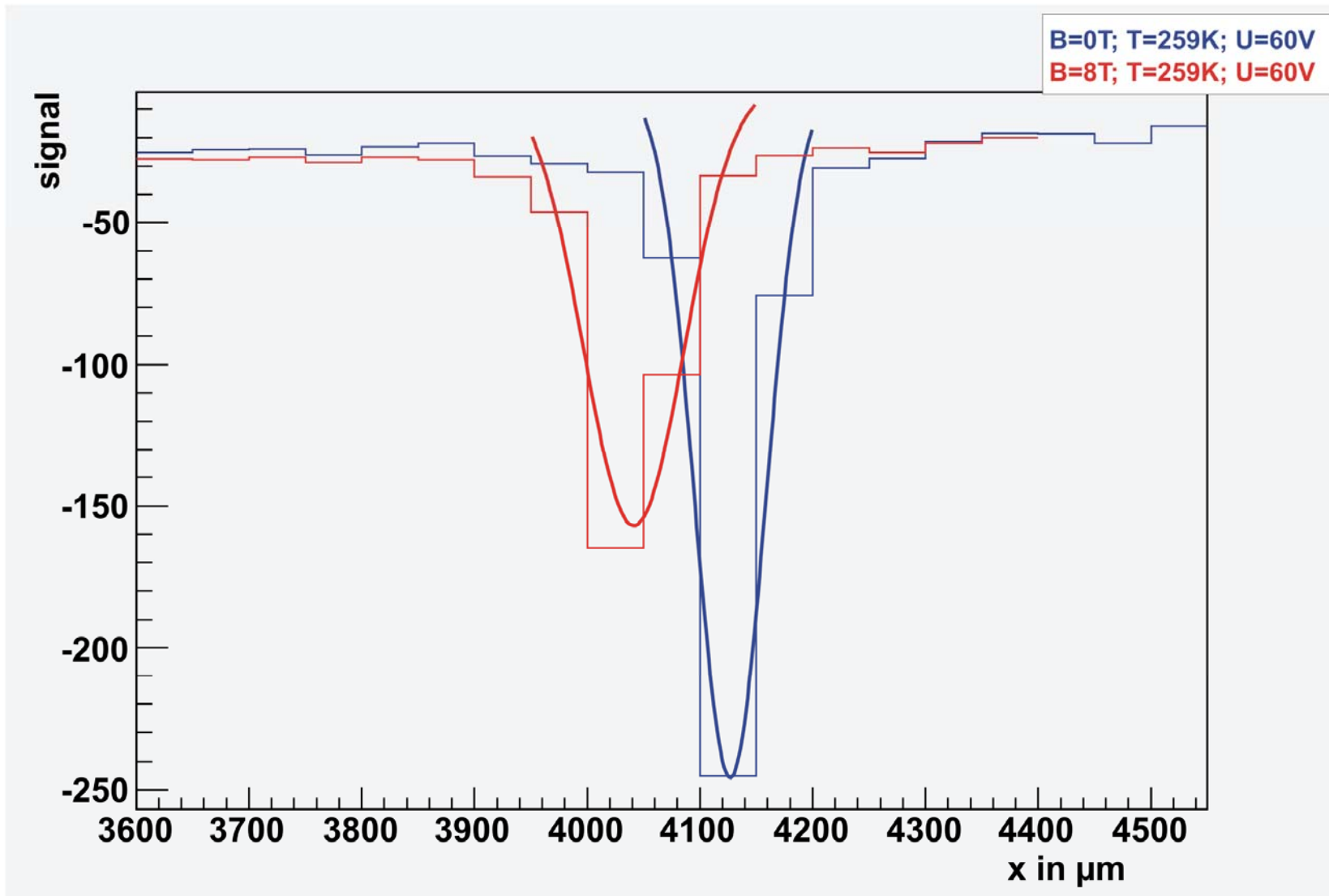
measurement setup



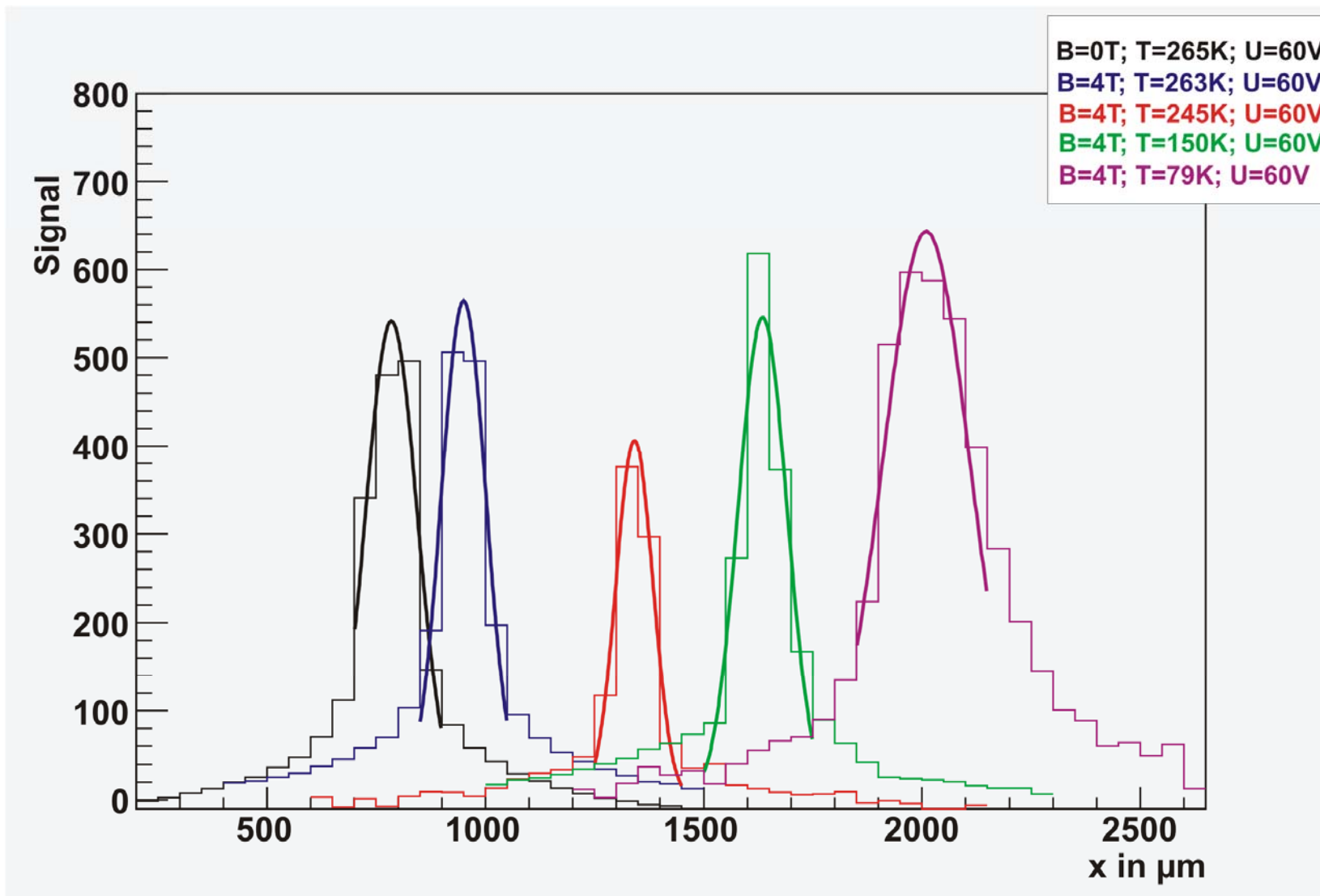
Measured signals



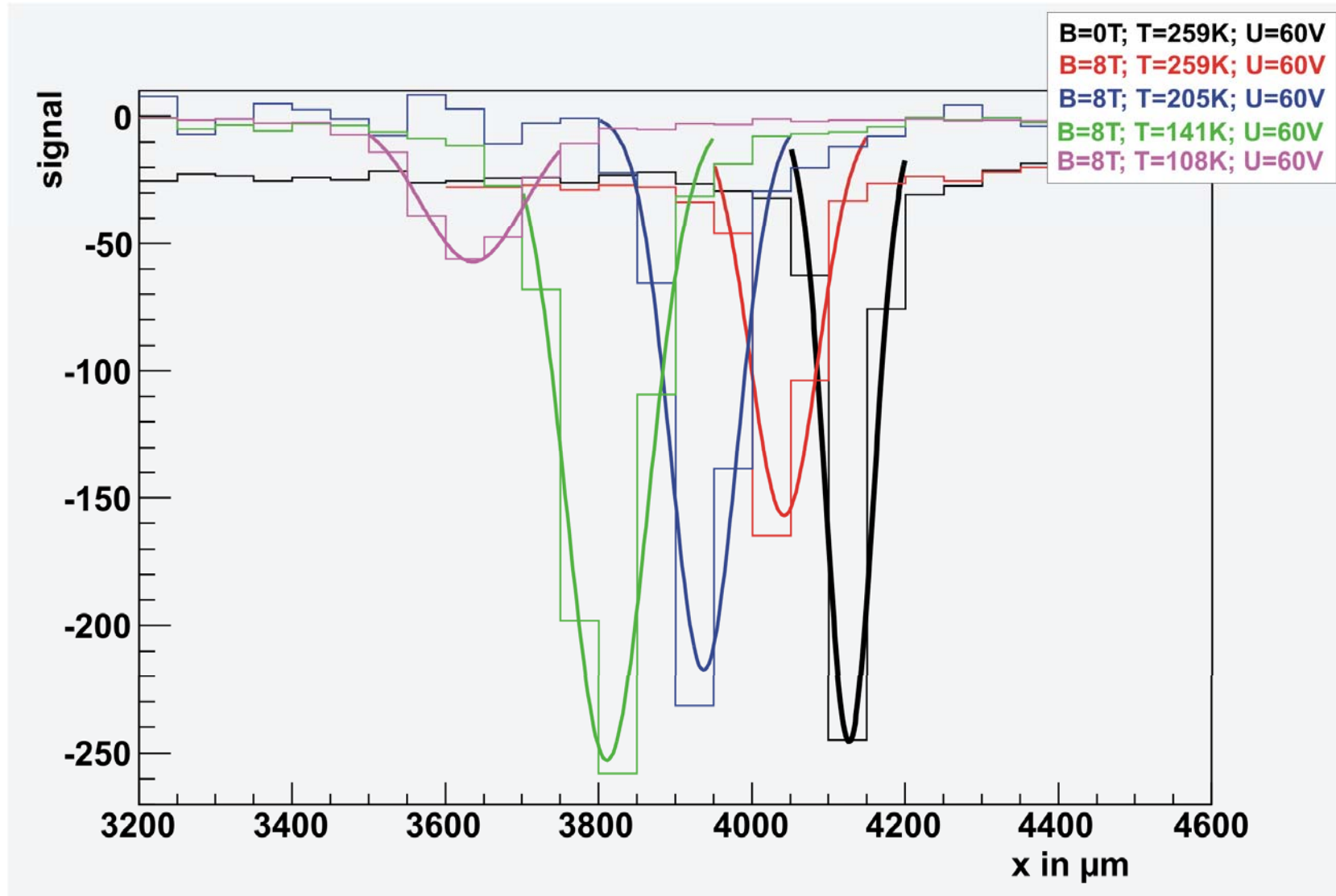
Holes before irradiation



Lorentzshift of electrons with different temperatures



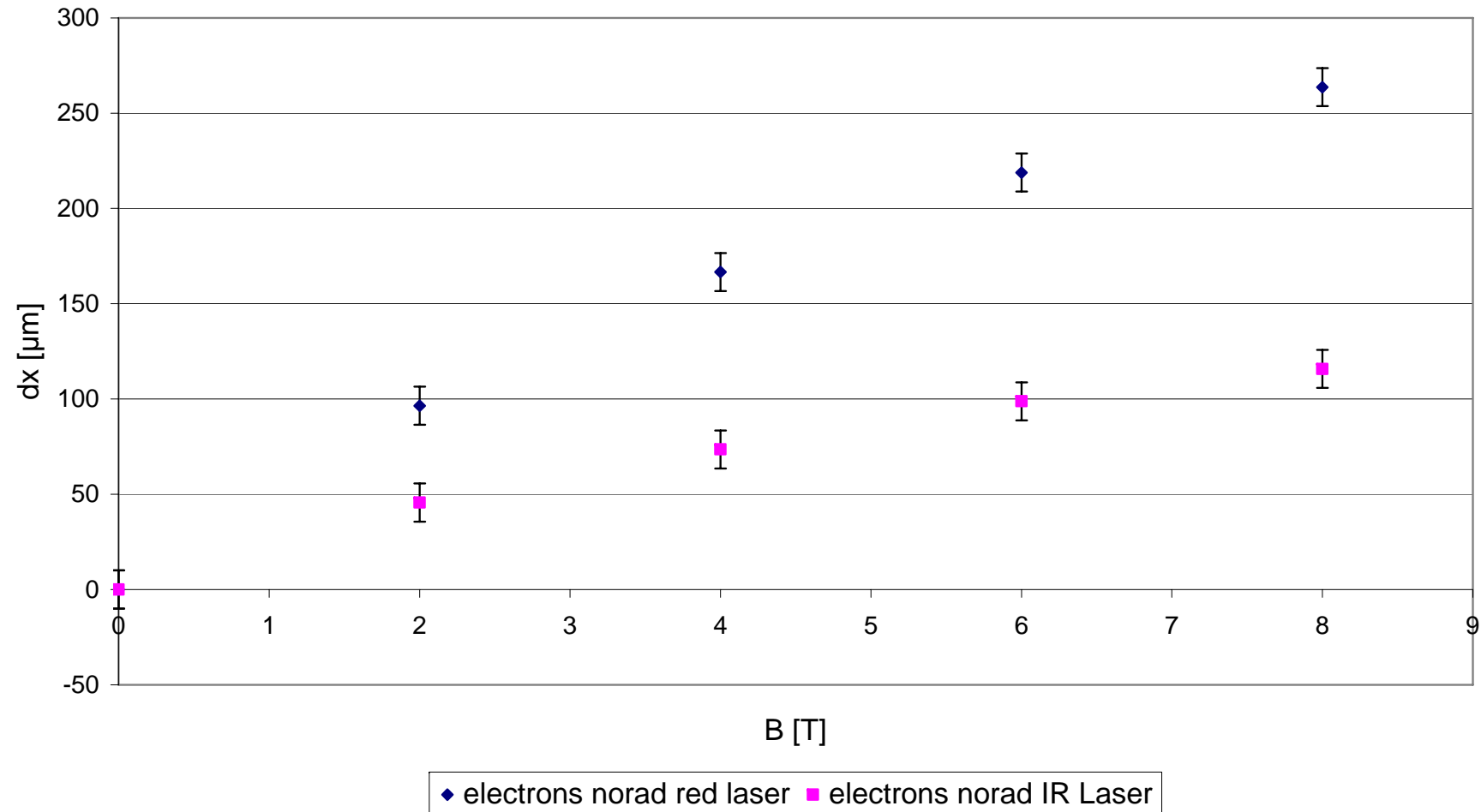
lorentzshift of holes with different temperatures



red vs infrared laser



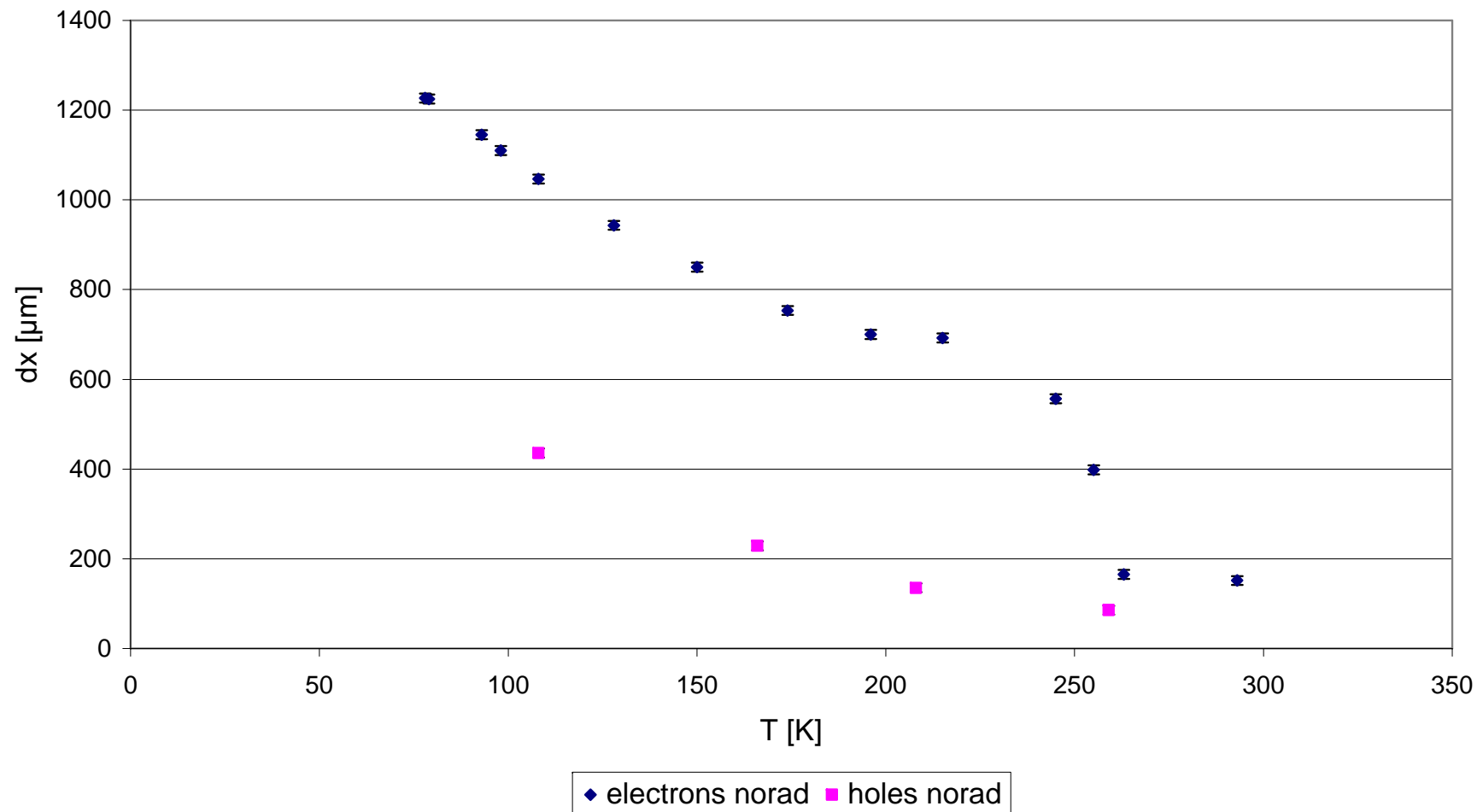
Lorentzshift with red and infrared laser for 258K



Electrons and holes over temperature



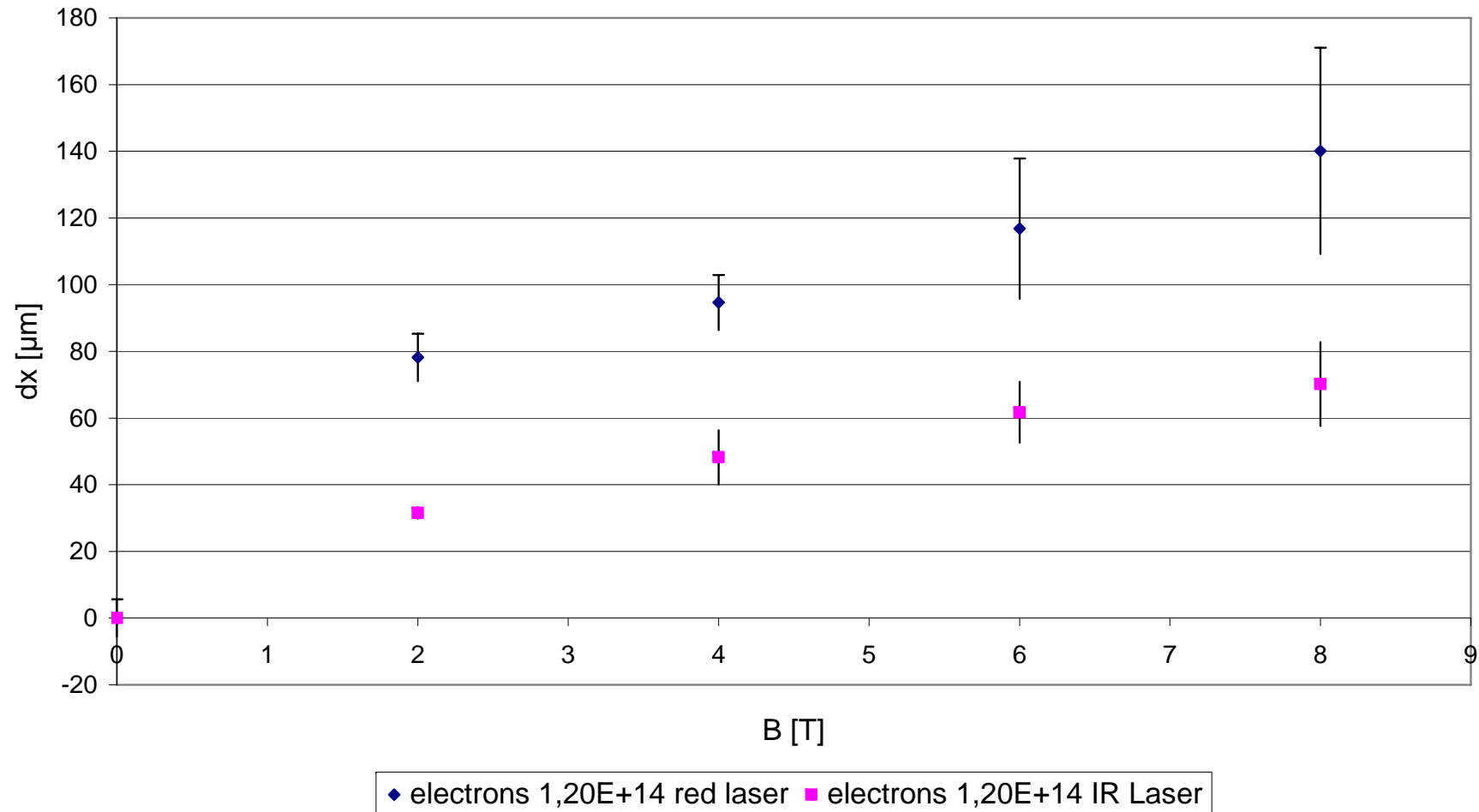
lorentzshift with temperature



Lorentzshift of electrons for red and infrared laser after irradiation



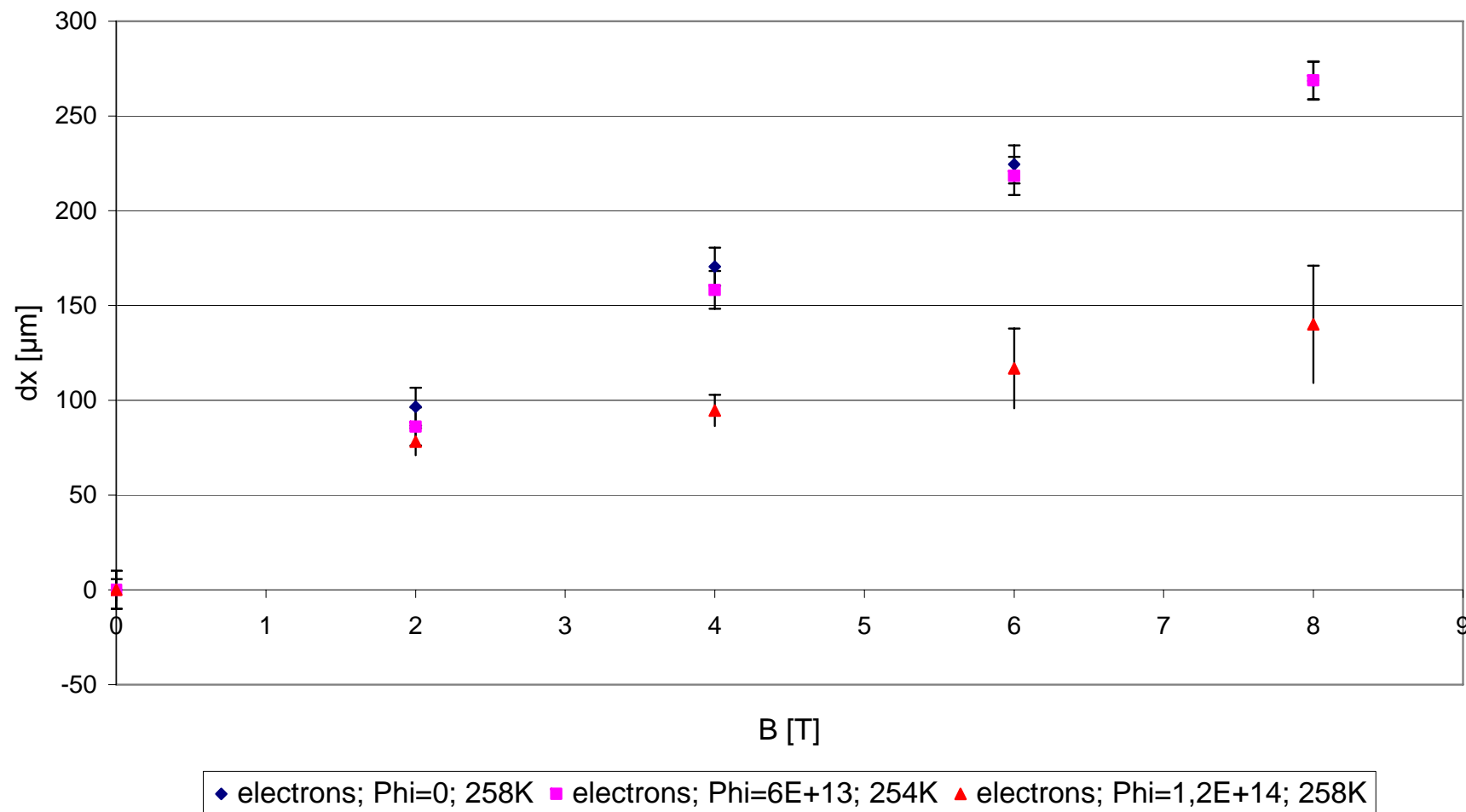
Lorentzshift red vs. Infrared laser after irradiation T=258K



Lorentzshift of electrons for different fluences



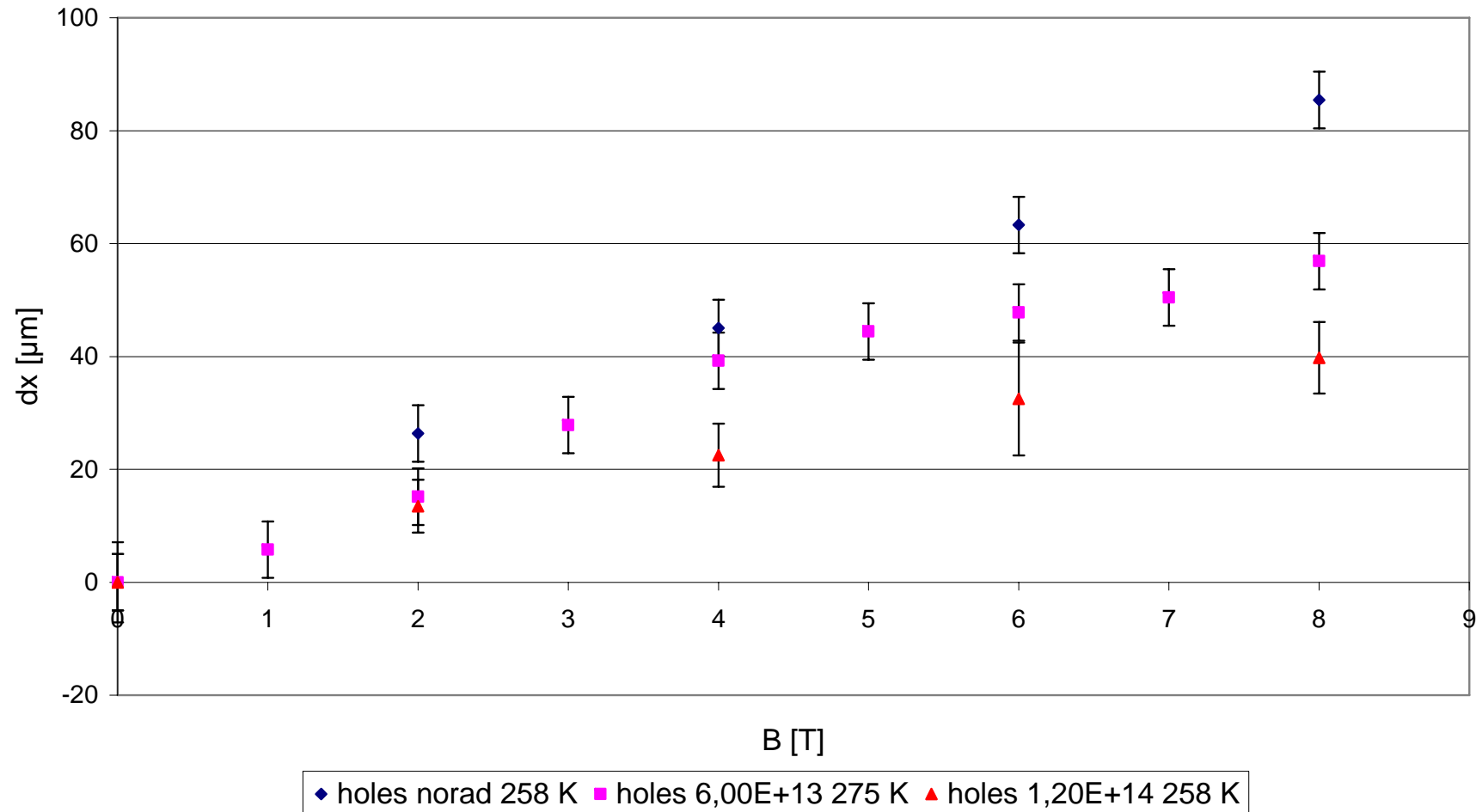
Lorentzshift of different fluences with red laser



Lorentzshift of holes for different fluences



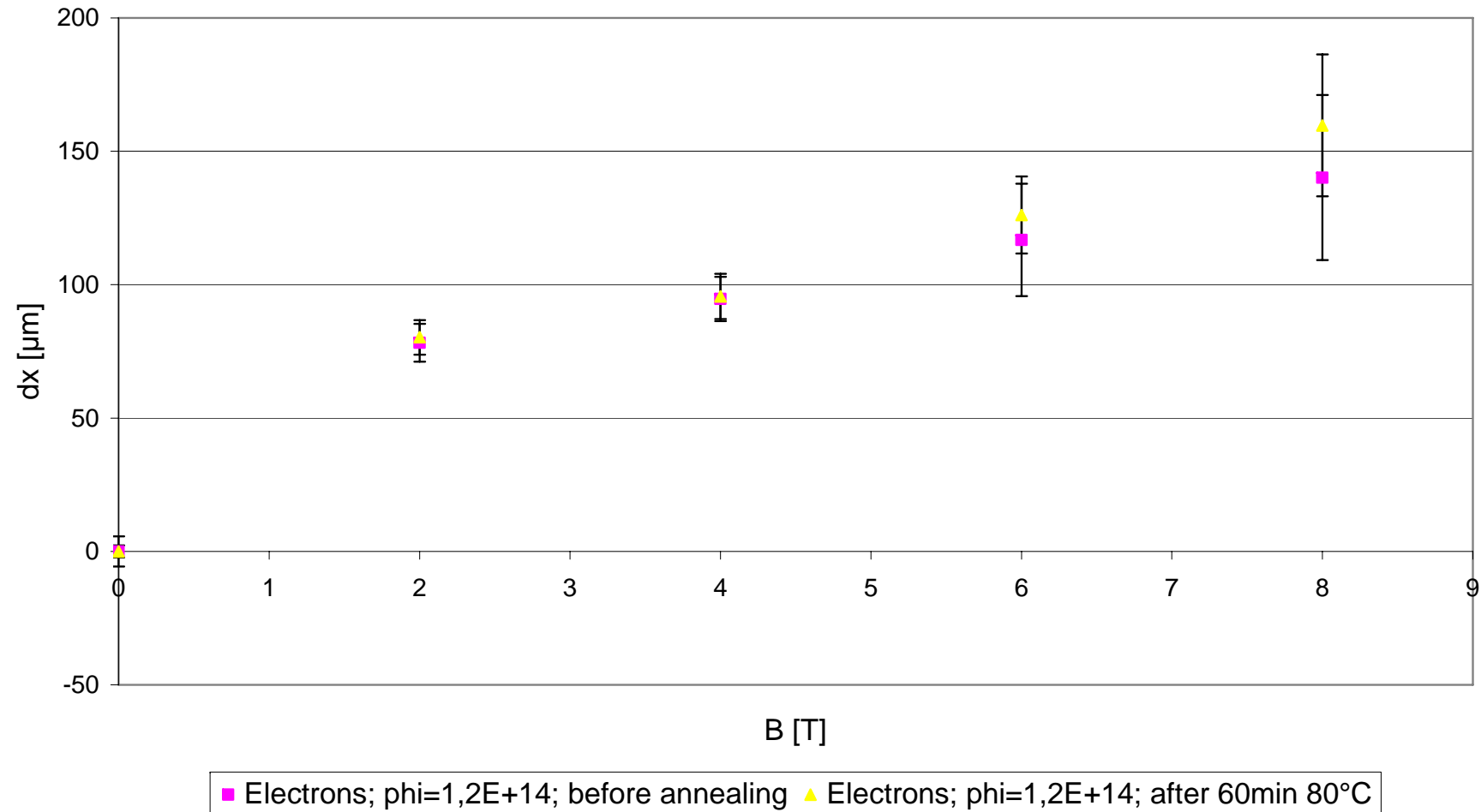
Lorentzshift of different fluences



Influence of annealing



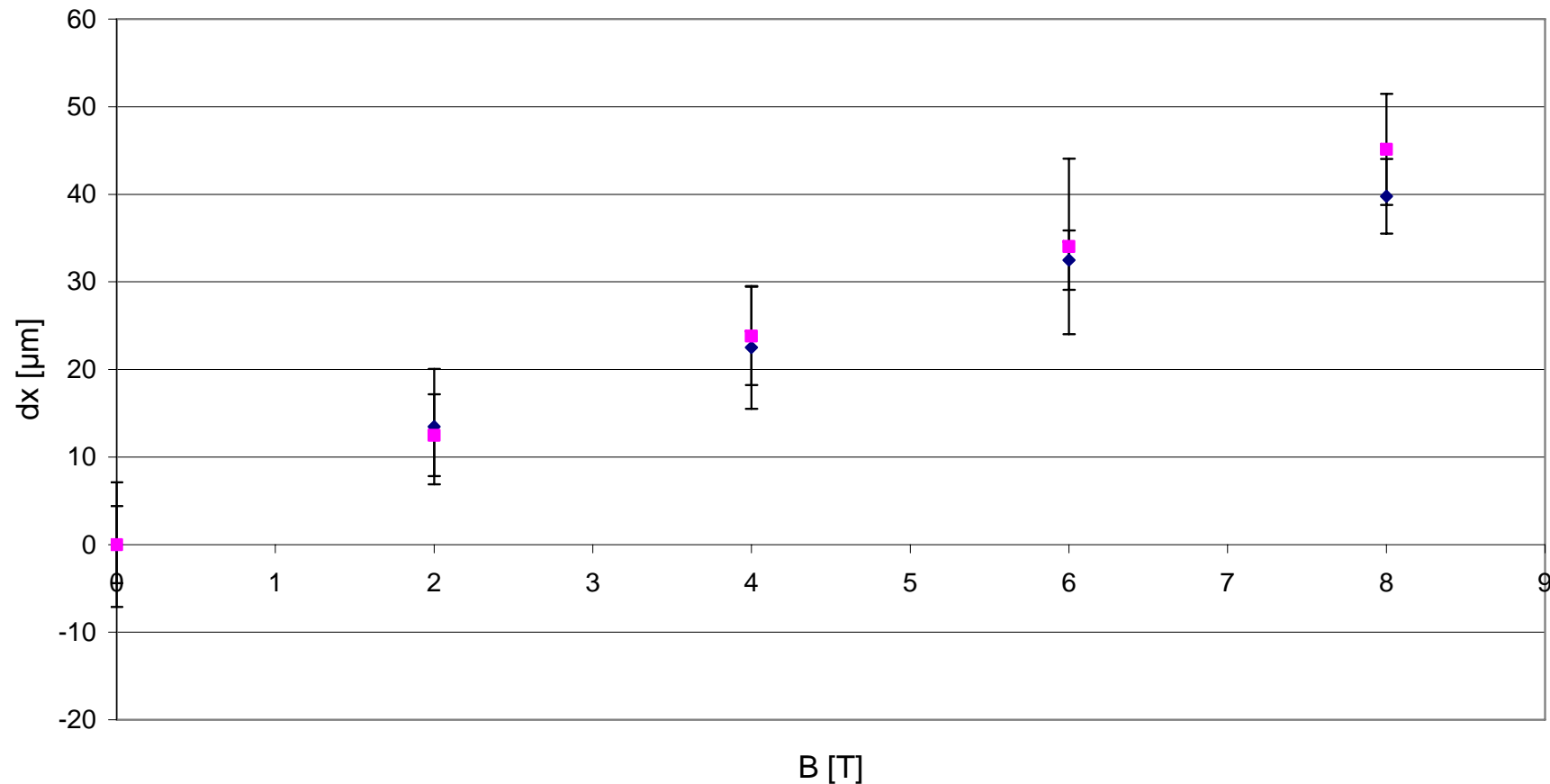
electrons at T=258K



Infulence of annealing



holes at T=258K



◆ holes; $\phi=1,2E+14$; before annealing ■ holes; $\phi=1,2E+14$; after 60min @80°C



summary

- Lorentz angle is affected by radiation and temperature
- Annealing shows no significant effect
- The effects will be significant in future HEP experiments
- More research is necessary to make corrections in track reconstruction
- Higher fluences coming soon