

Investigation of the Magnetic Proximity Effect by ^7Li beta-NMR

Experiment M1165

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bNMR Group

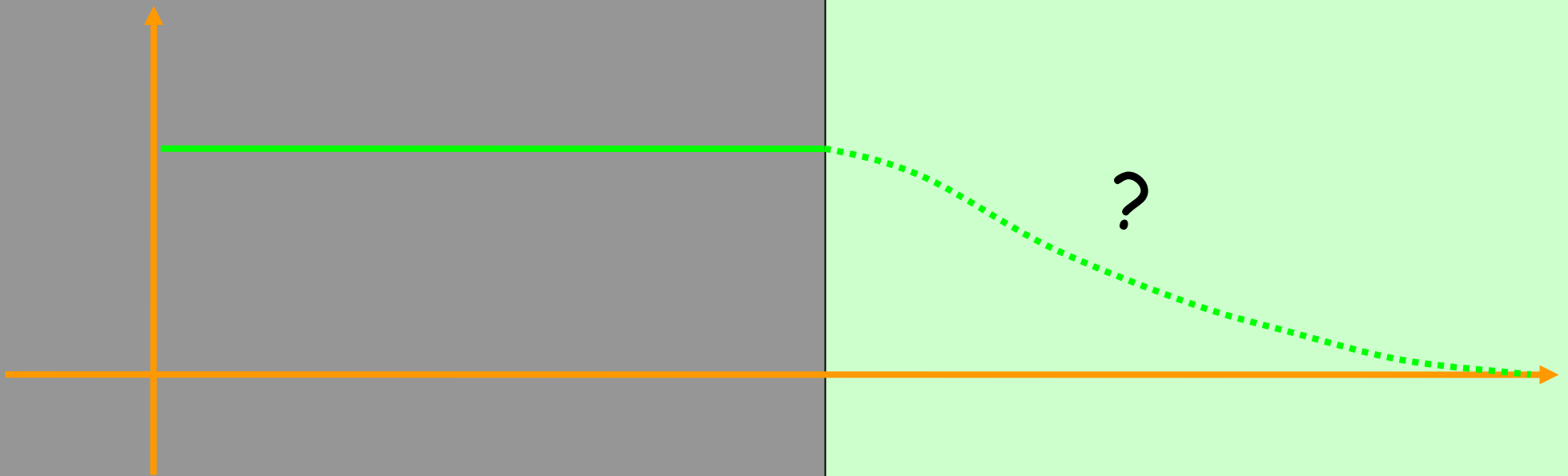


Magnetic Proximity Effect in Semiconductors

Metallic
Ferromagnet

Semiconductor

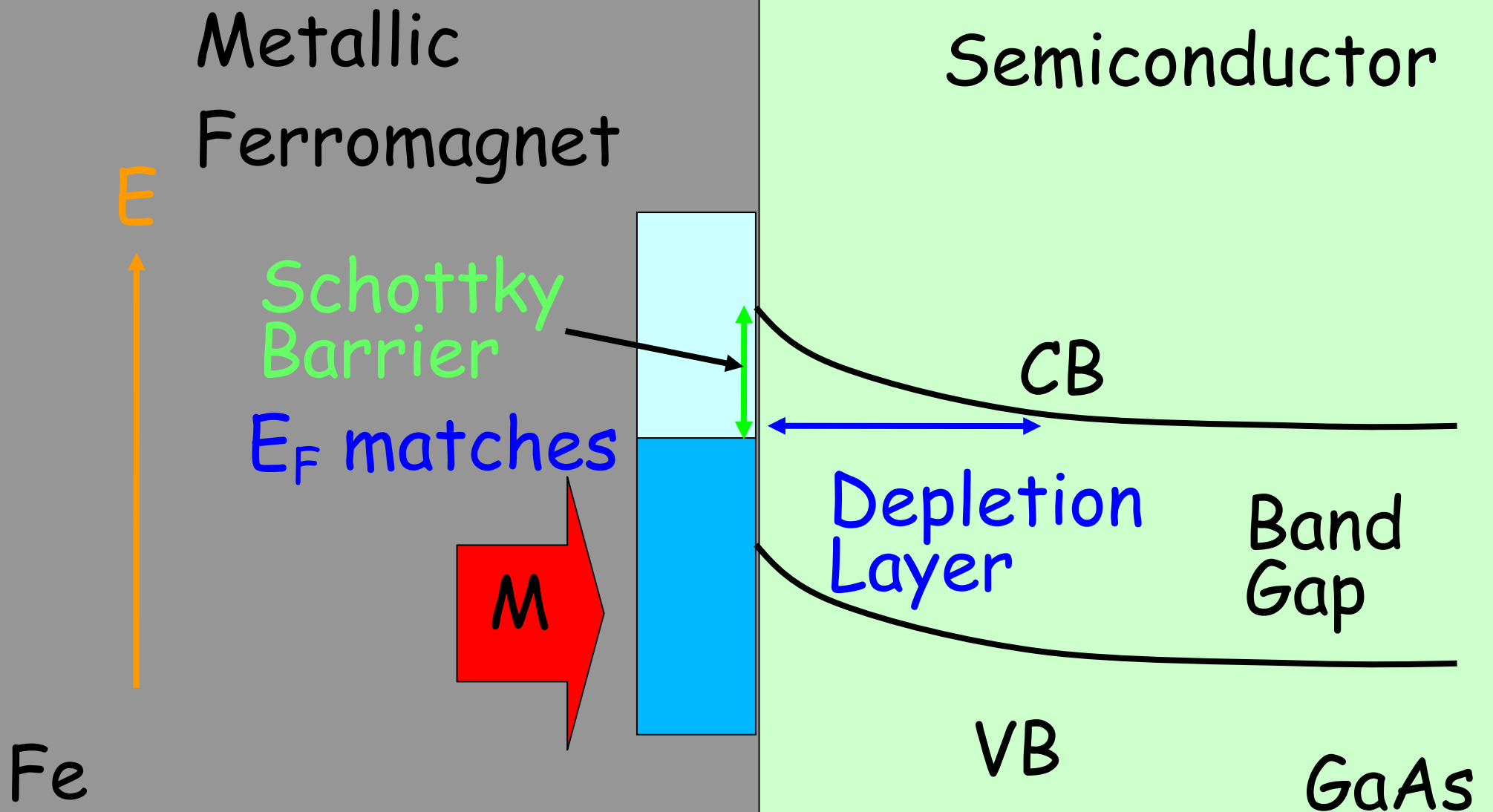
M



Fe

GaAs

Interfacial Electronic Structure



Questions of Interest

→ Can we observe magnetization in the semiconductor layer?

→ What is the temperature dependence?

20ML

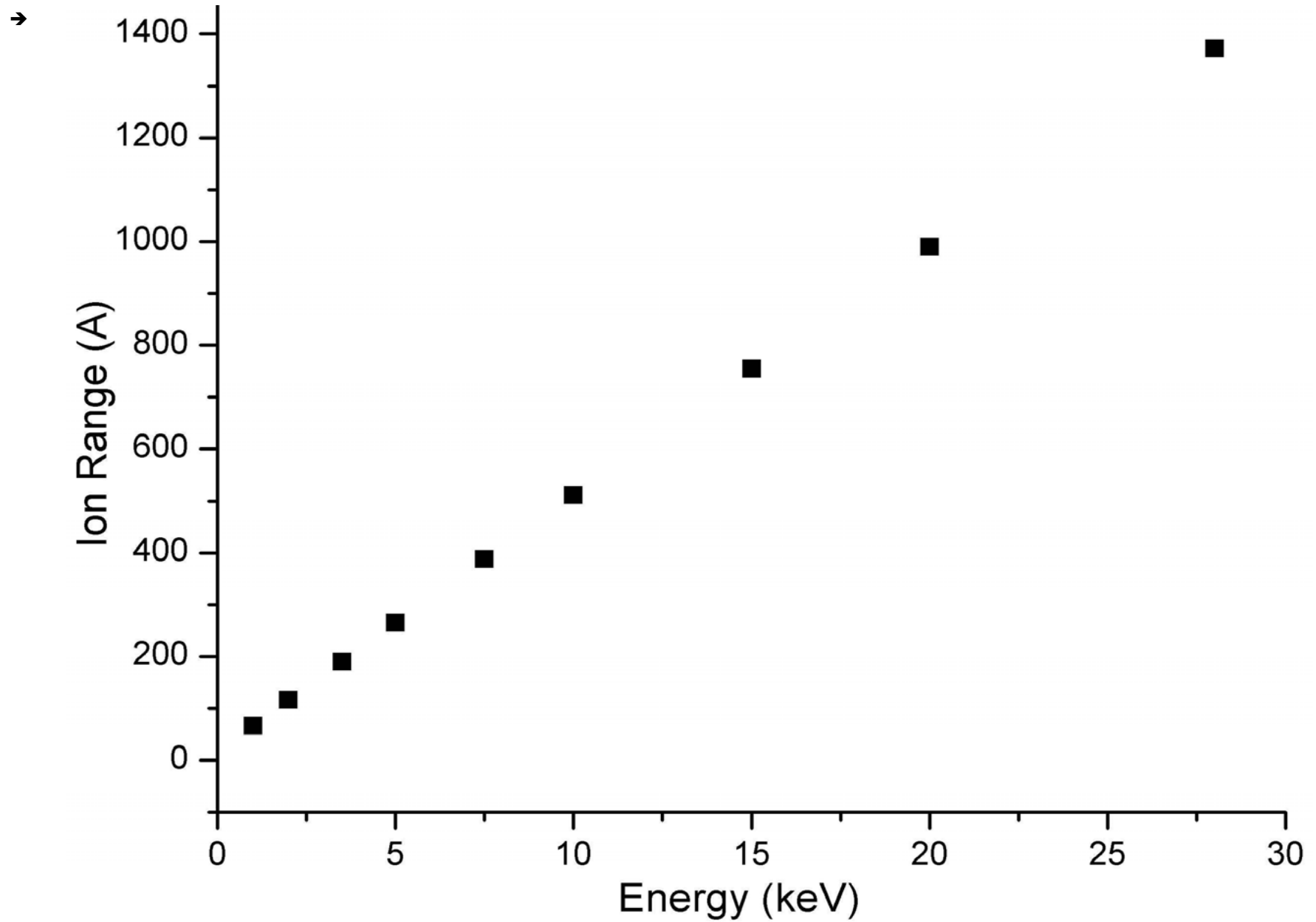
Au

14ML

Fe

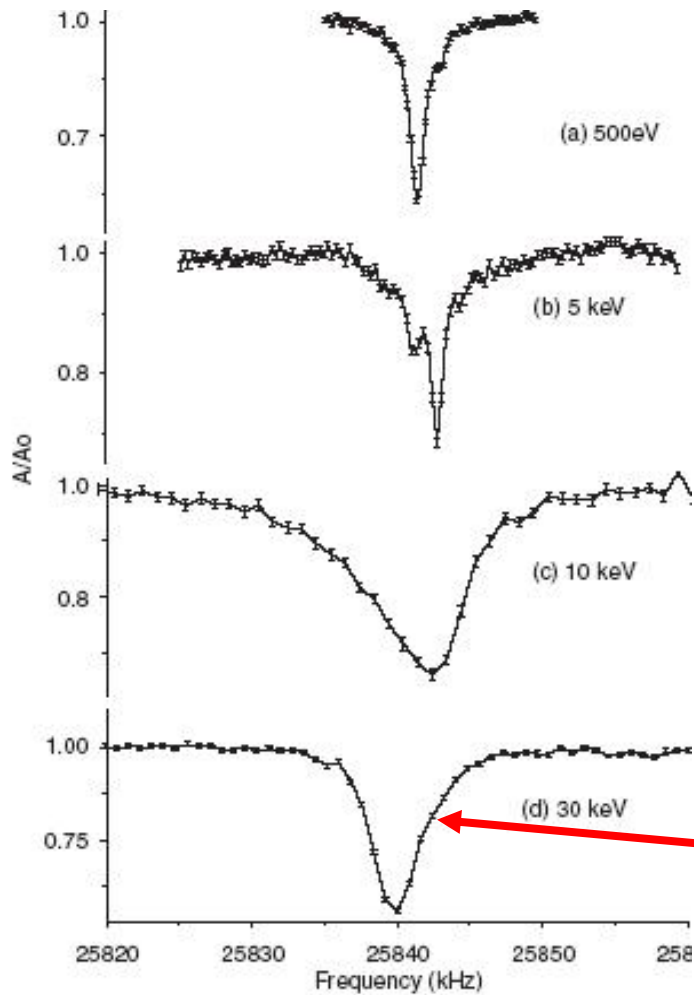
GaAs

Implantation Depth

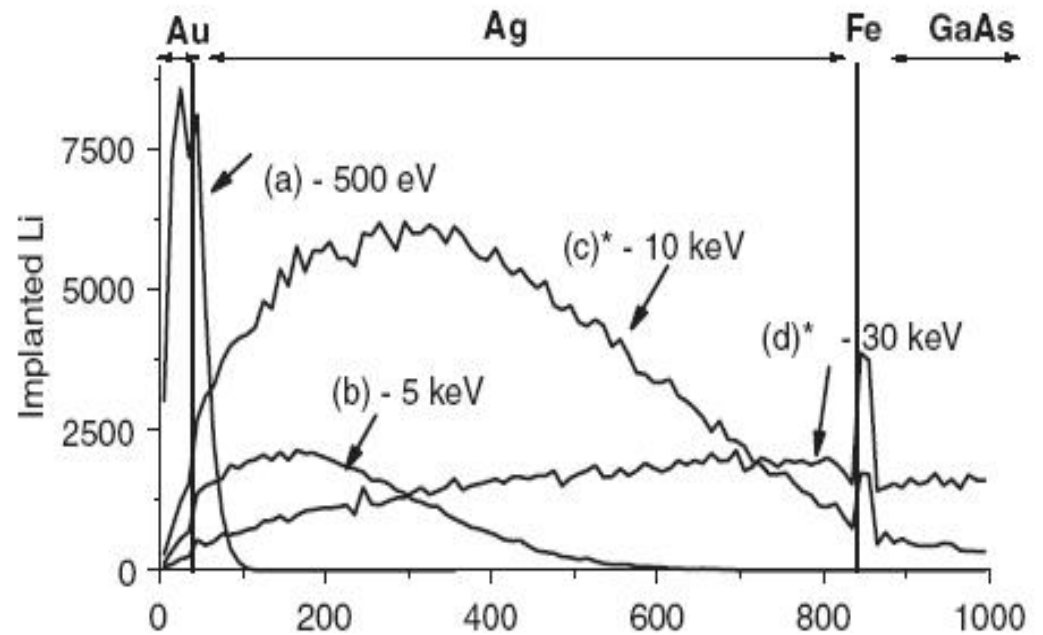


β NMR in Fe/Ag Heterostructures

- Ag/Fe/GaAs heterostructure, GaAs is semi-insulating(undoped)



- Line width varies with the depth

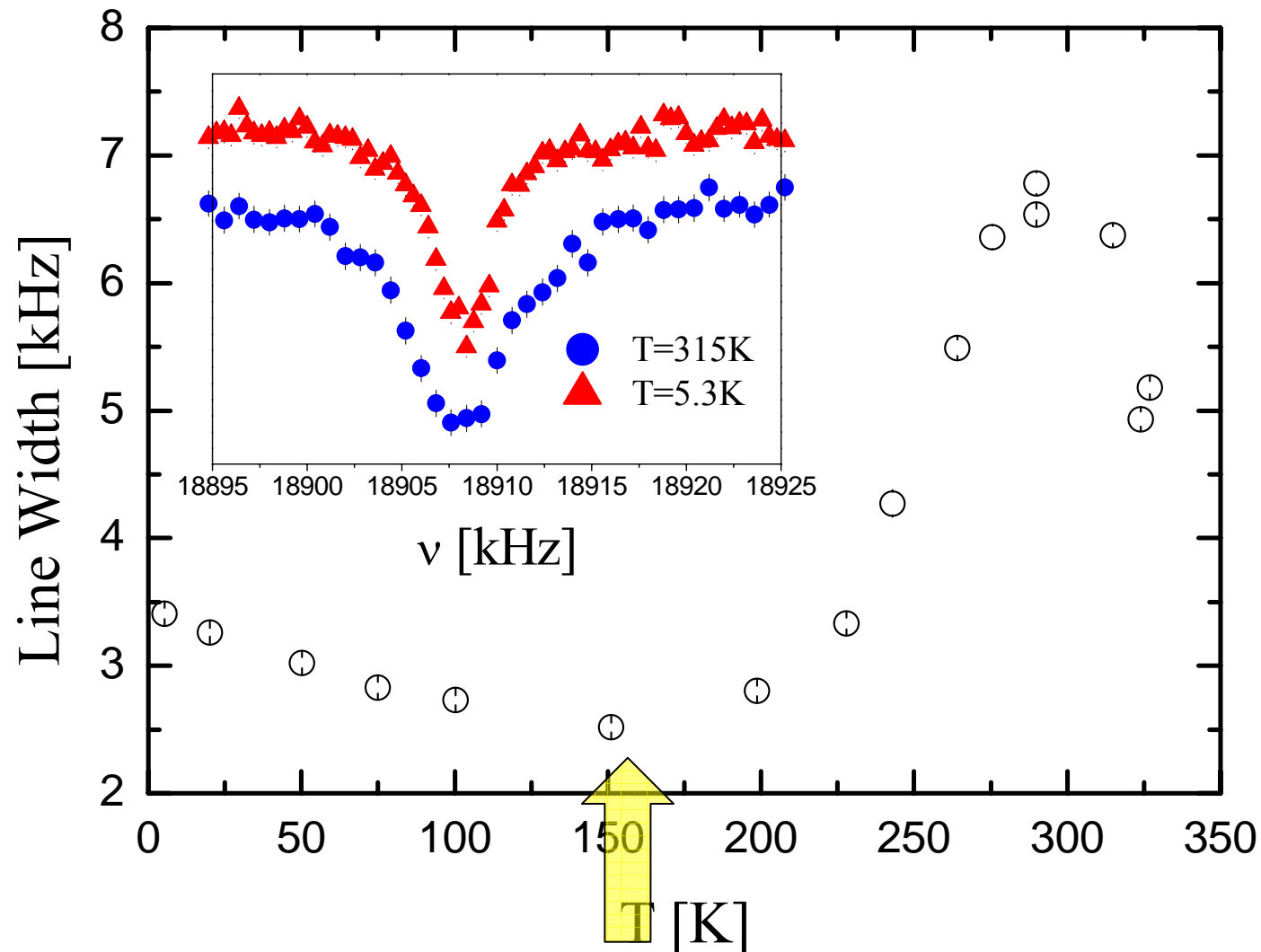


- Line width is broader than pure GaAs

T=285K

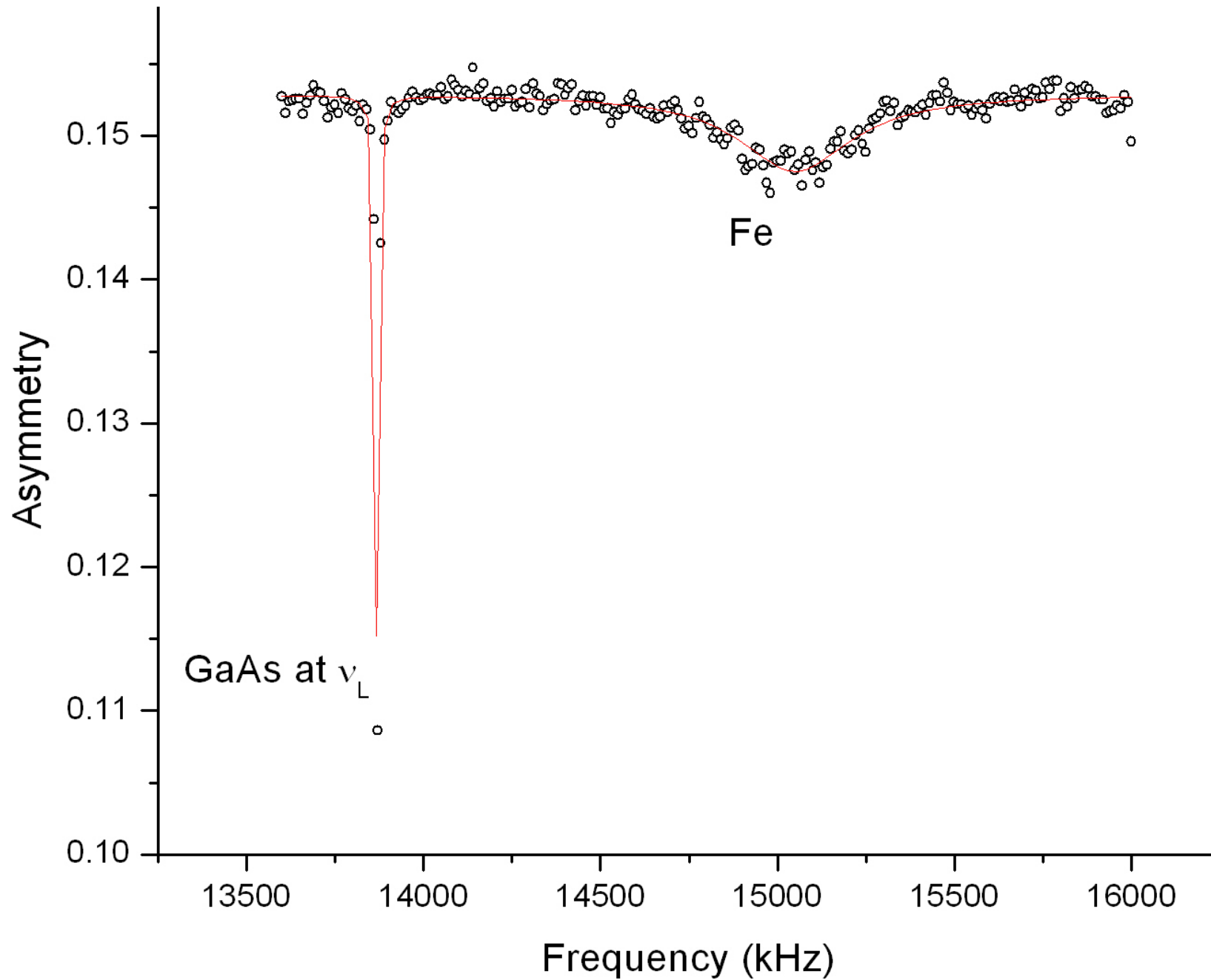
Phys.Rev. B 144429,77 (2008)

Li Resonances in Pure GaAs



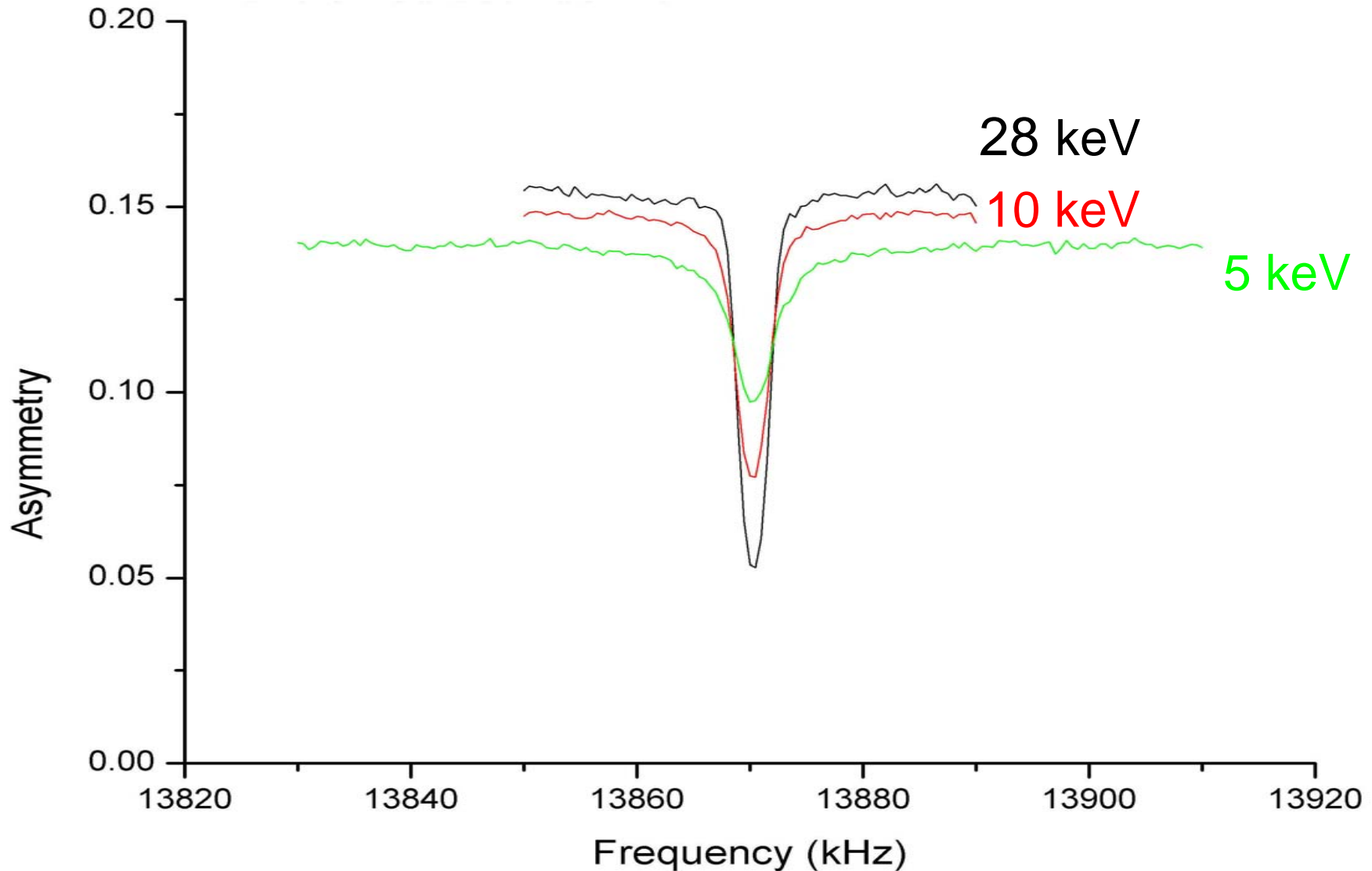
Minimal Linewidth

Resonance Spectrum of Fe



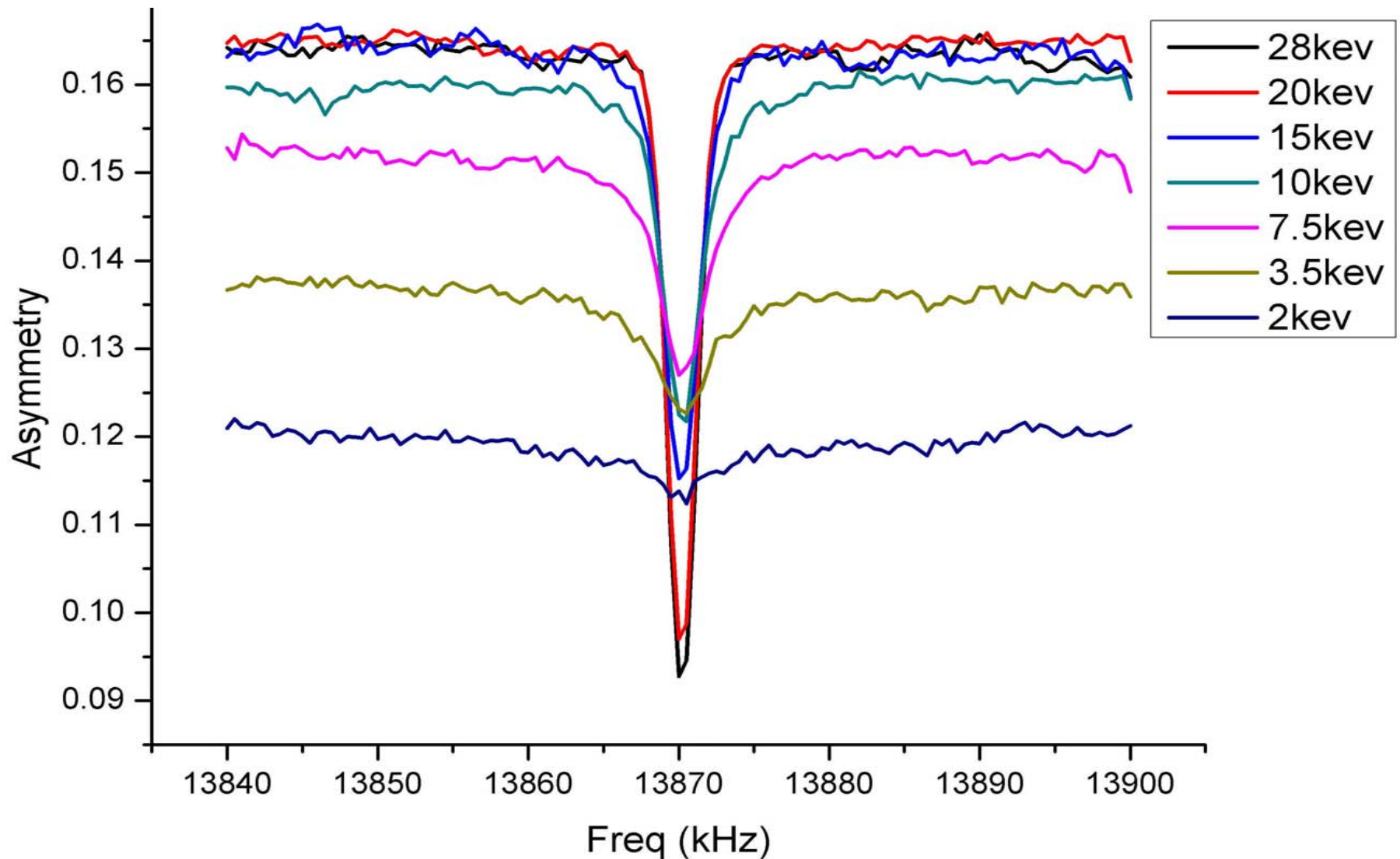
Question 1: can we see magnetization in GaAs?

T=240K

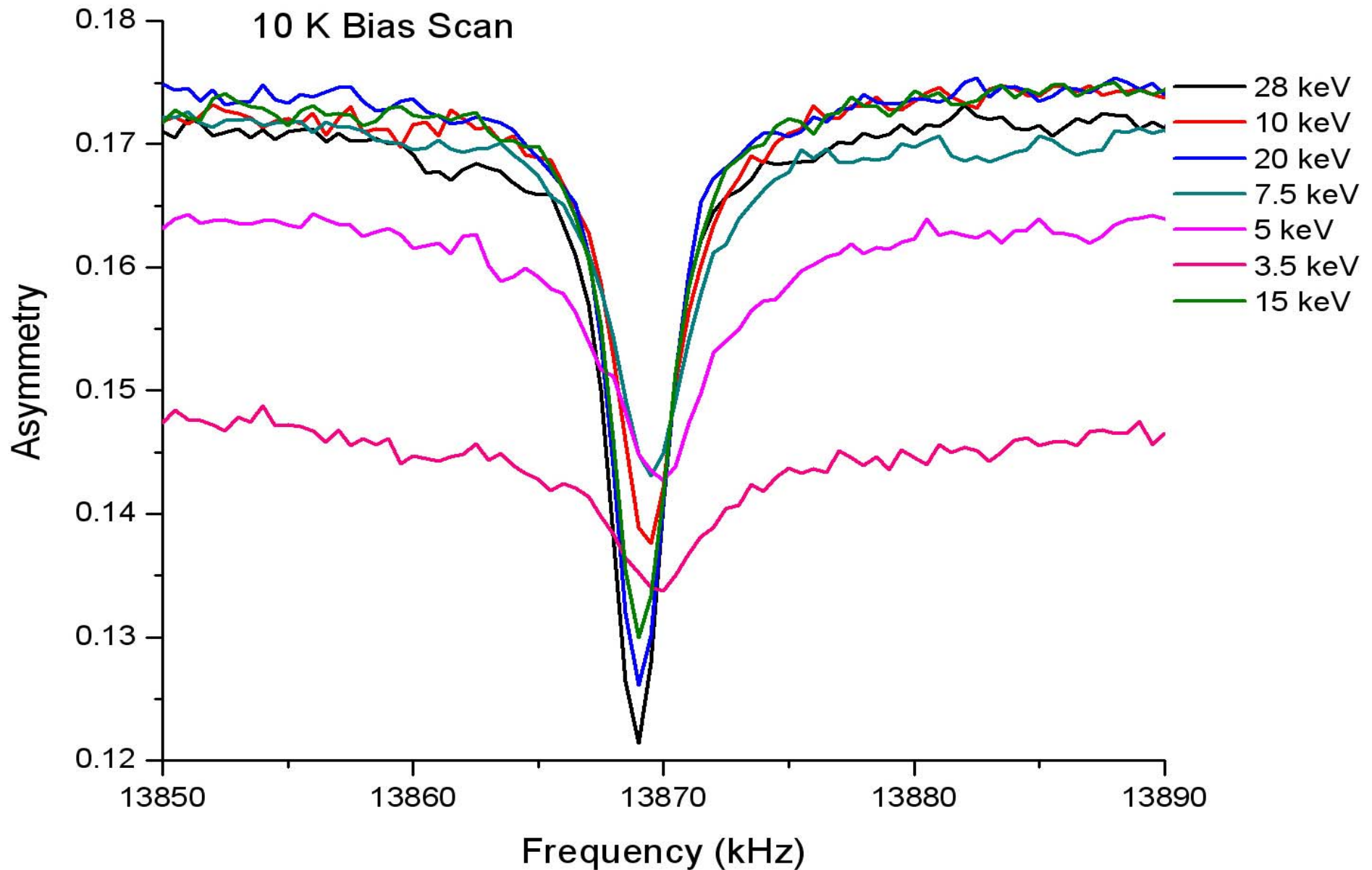


Question 1: can we see the magnetization in GaAs?

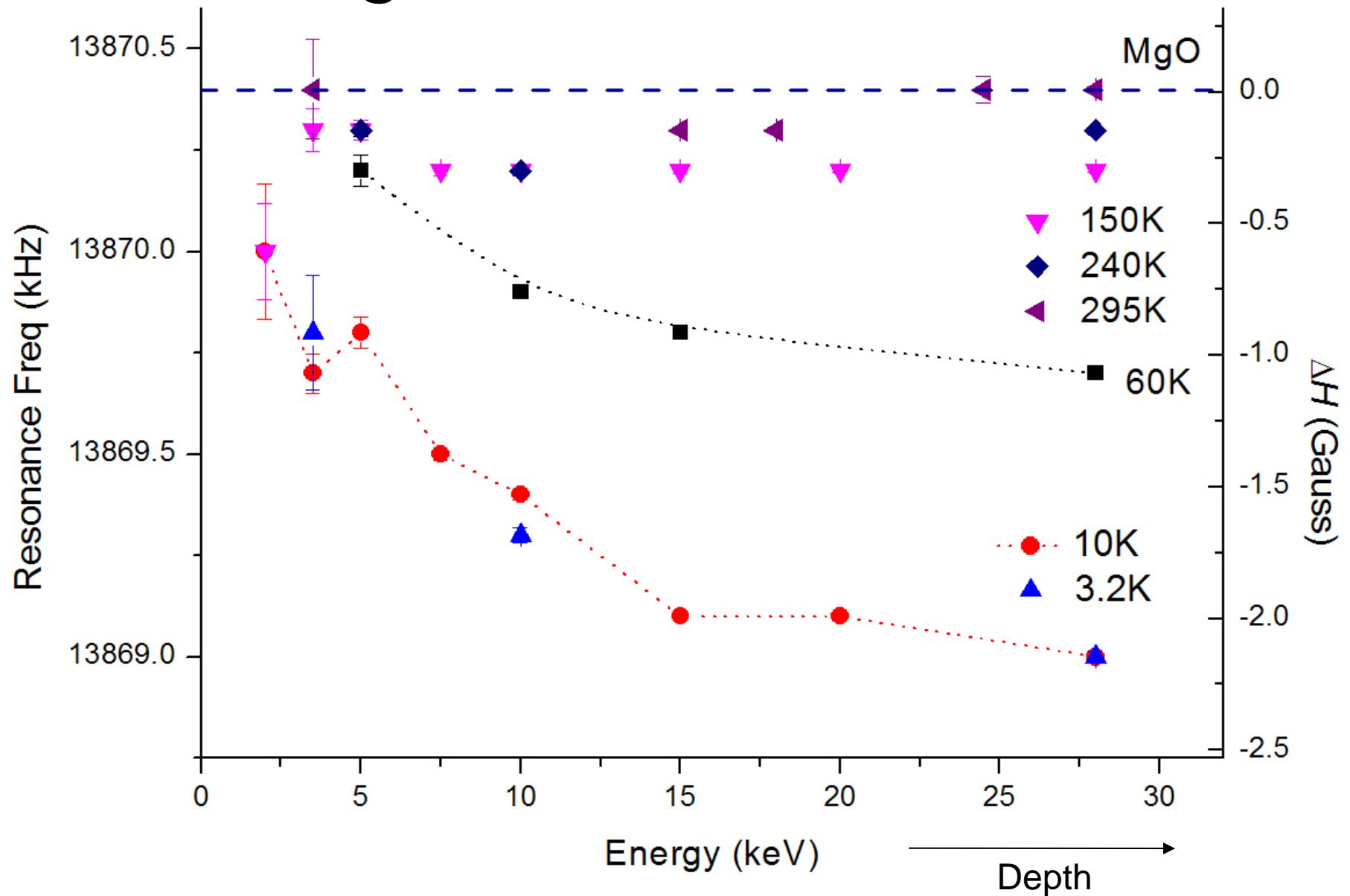
T = 150K



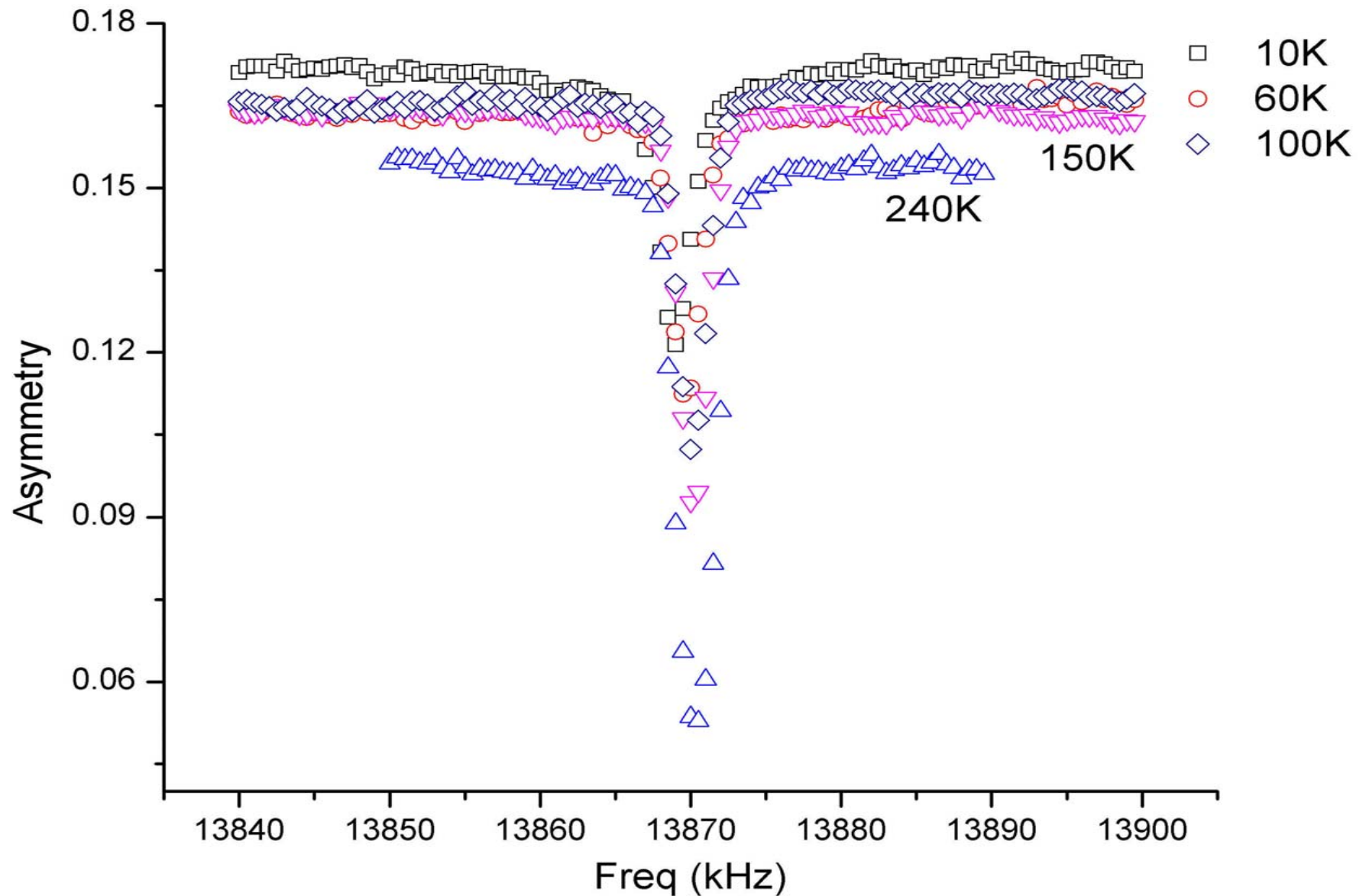
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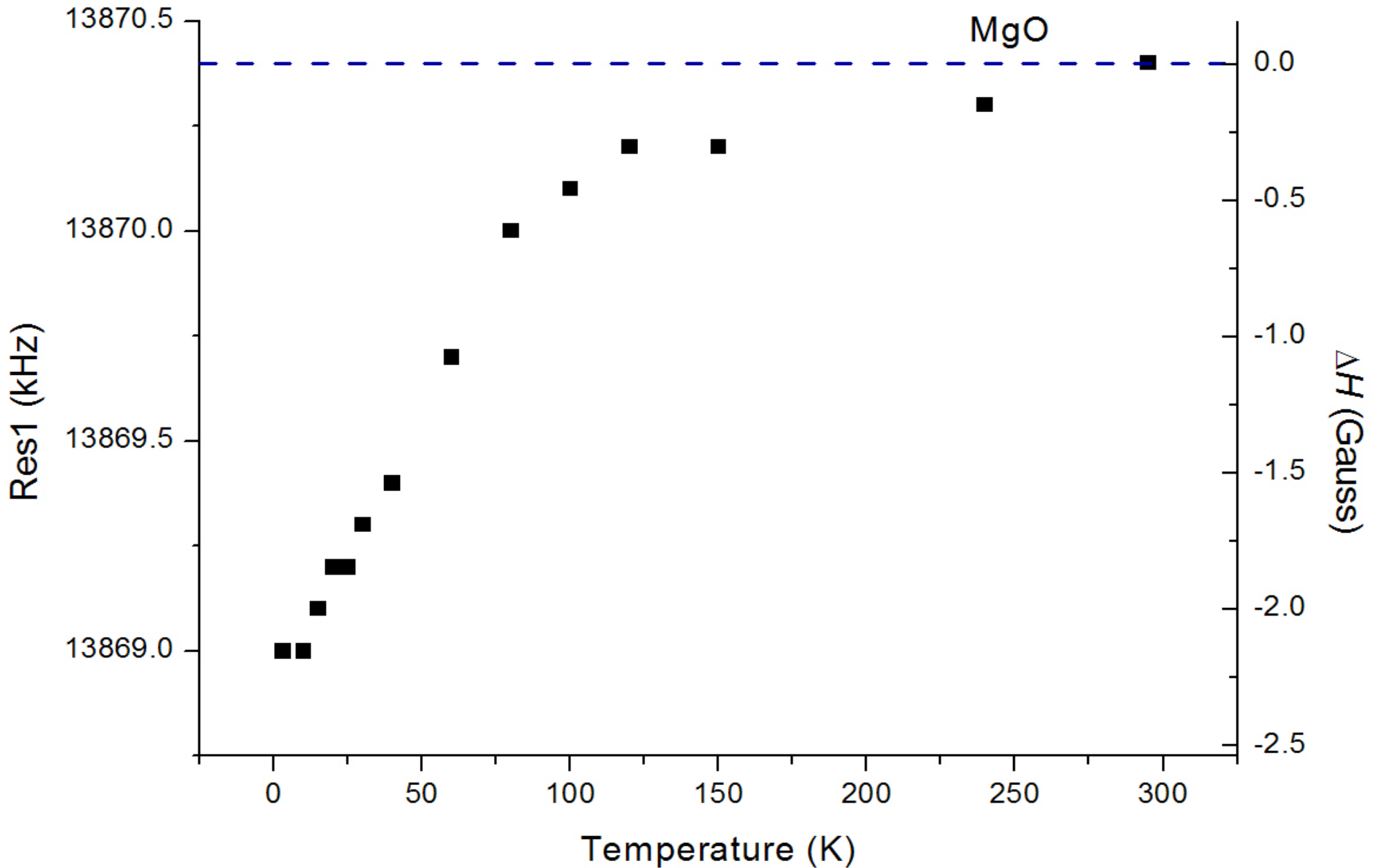
Question 1: can we see the magnetization in GaAs?



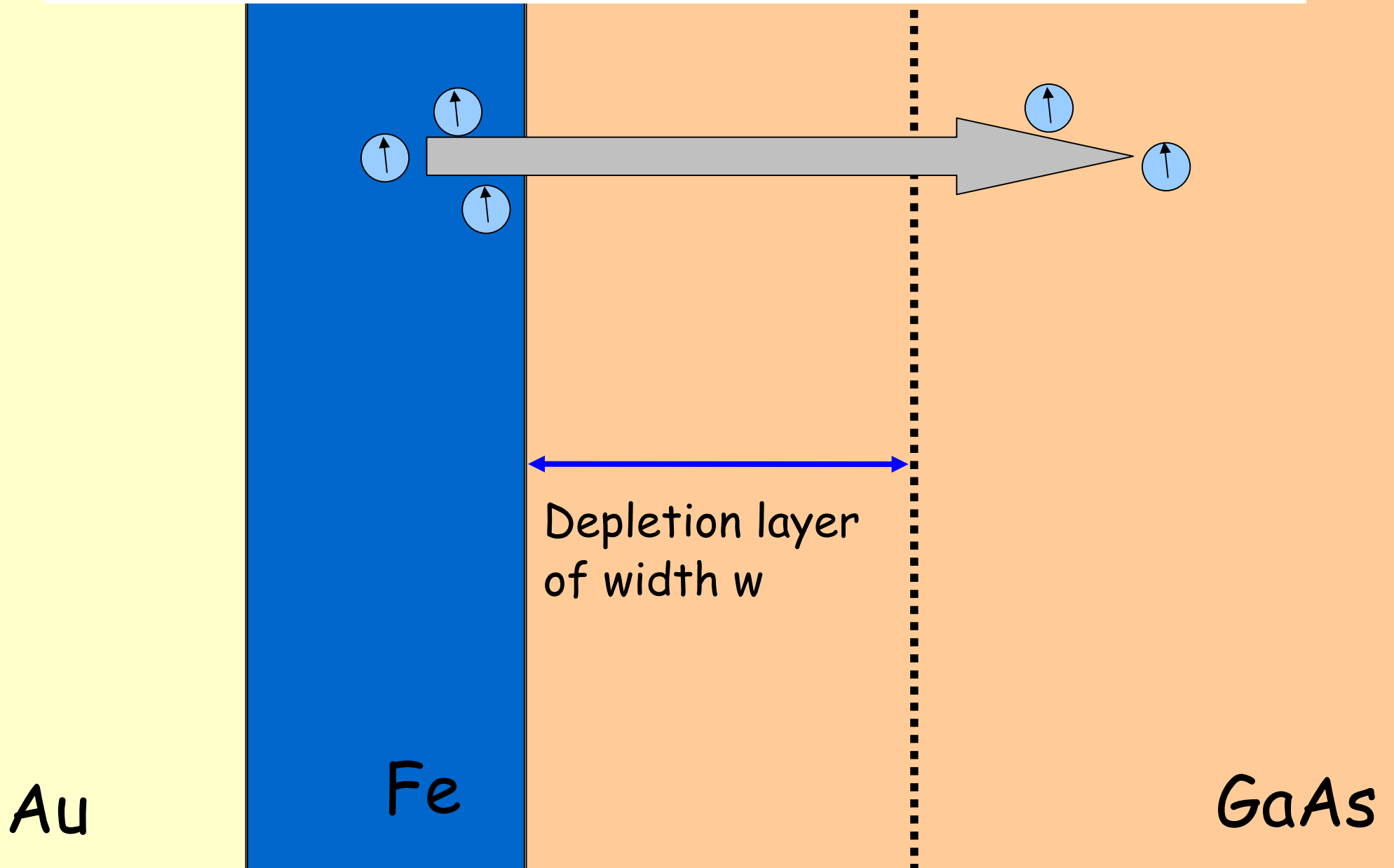
Question 2: What is the temperature dependence?



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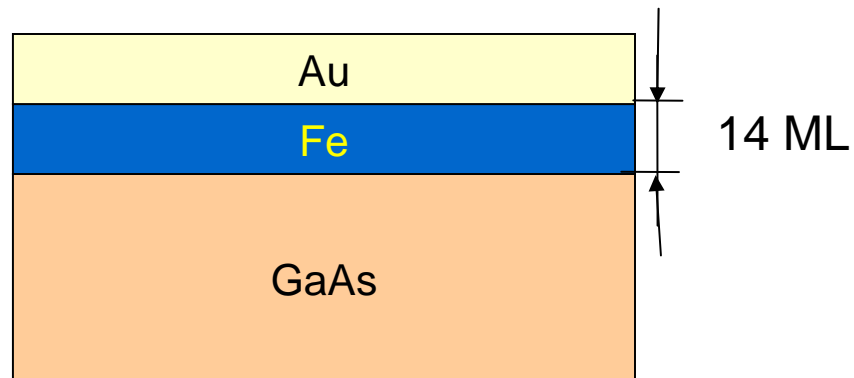
Possible Explanations



Future Work

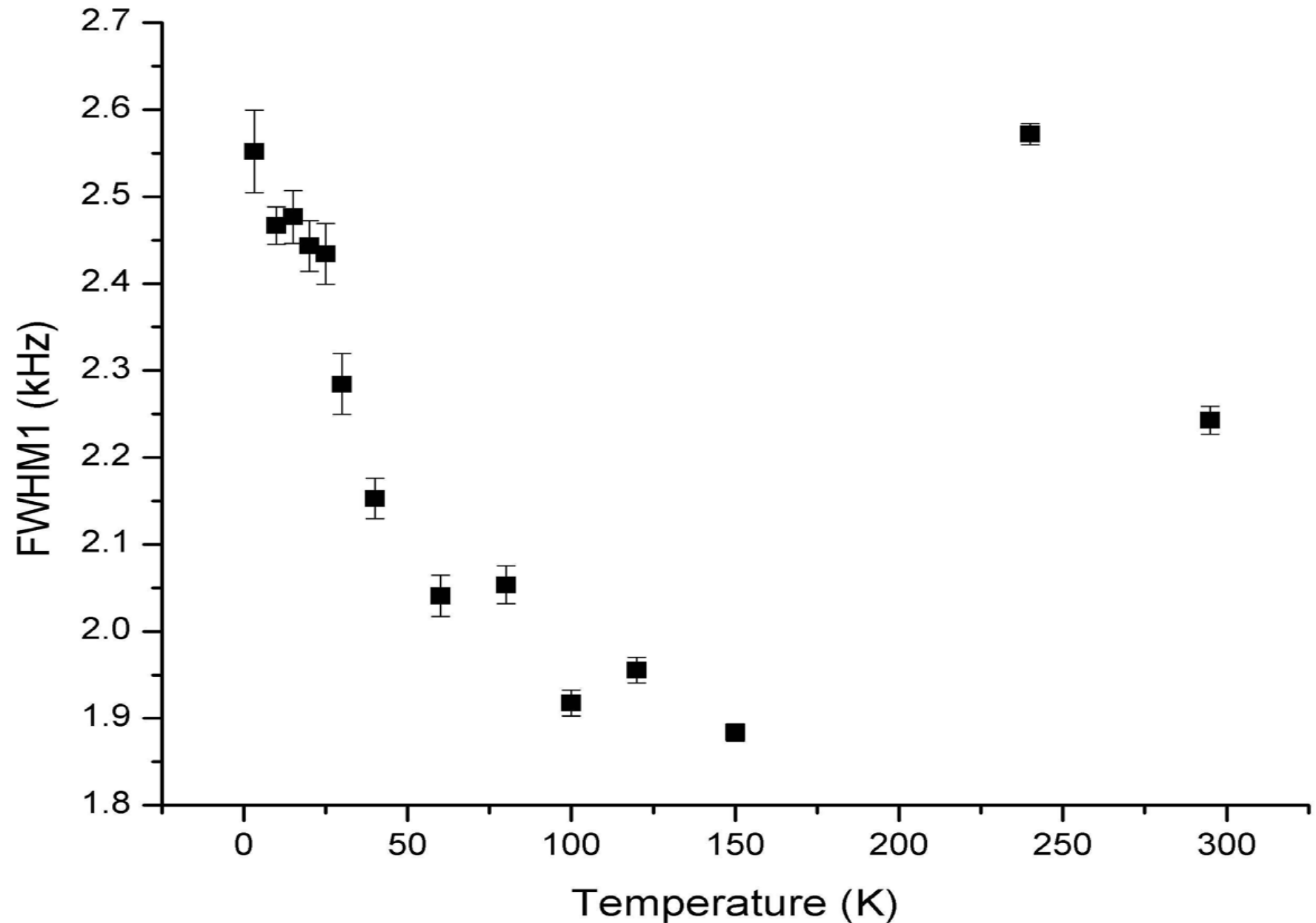
Repeat the measurements at another magnetic field

Spin injection



Thanks

Question 2: How does the resonance behave?



Beam rate of β -NMR

