

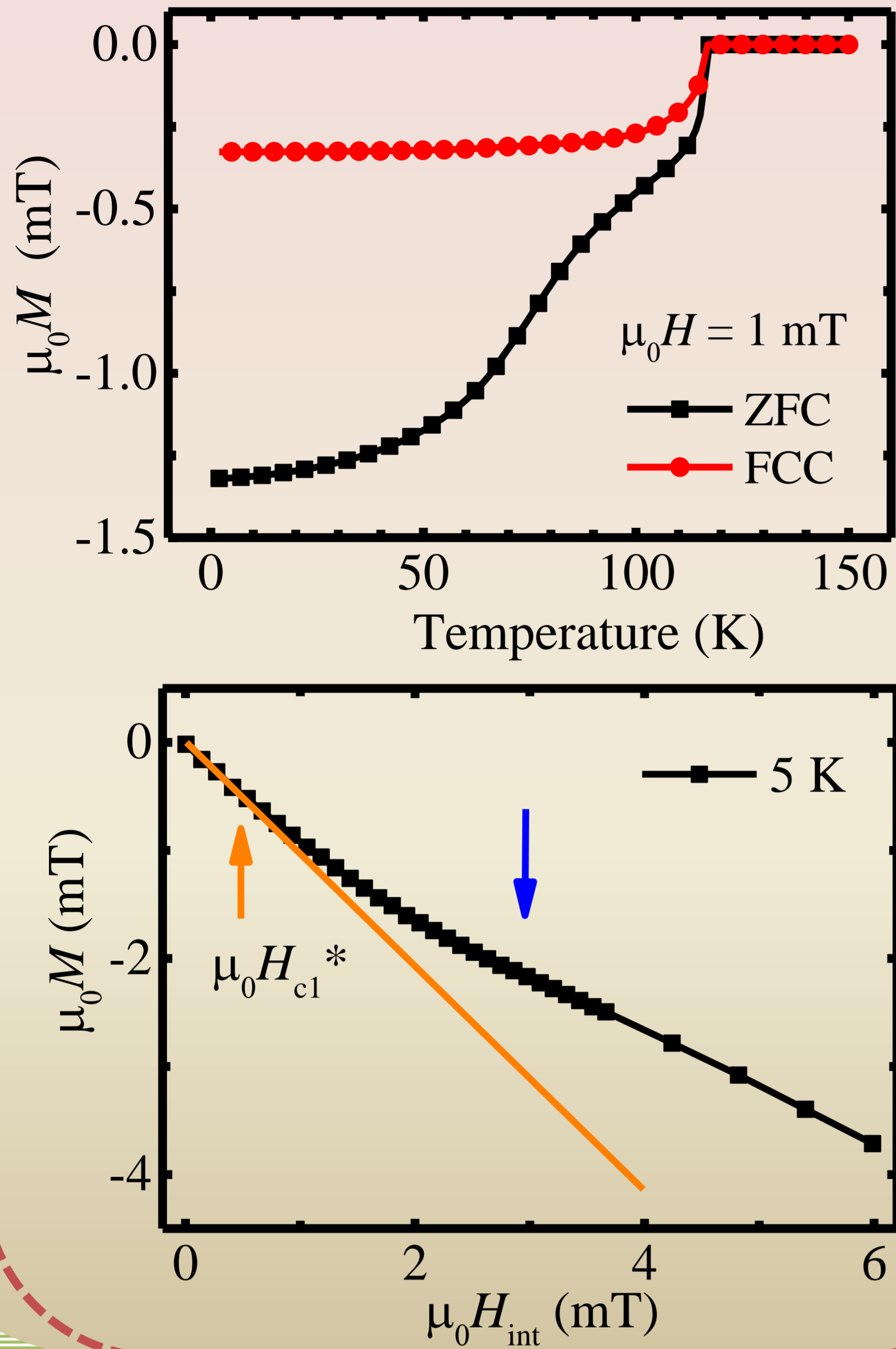
Thermodynamic properties of superconducting $\text{CuBa}_2\text{Ca}_3\text{Cu}_4\text{O}_{10+\delta}$ (Cu1234) system

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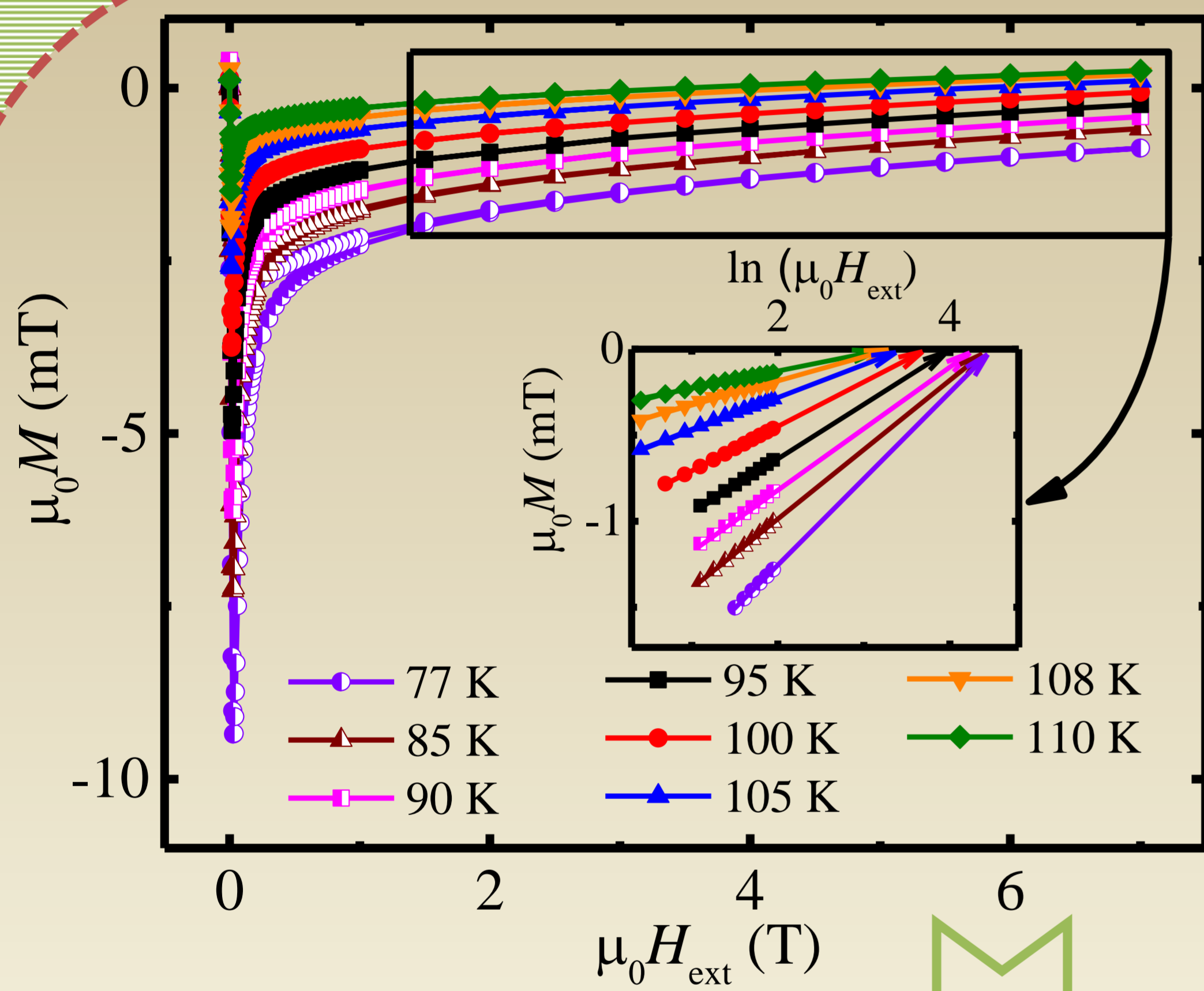
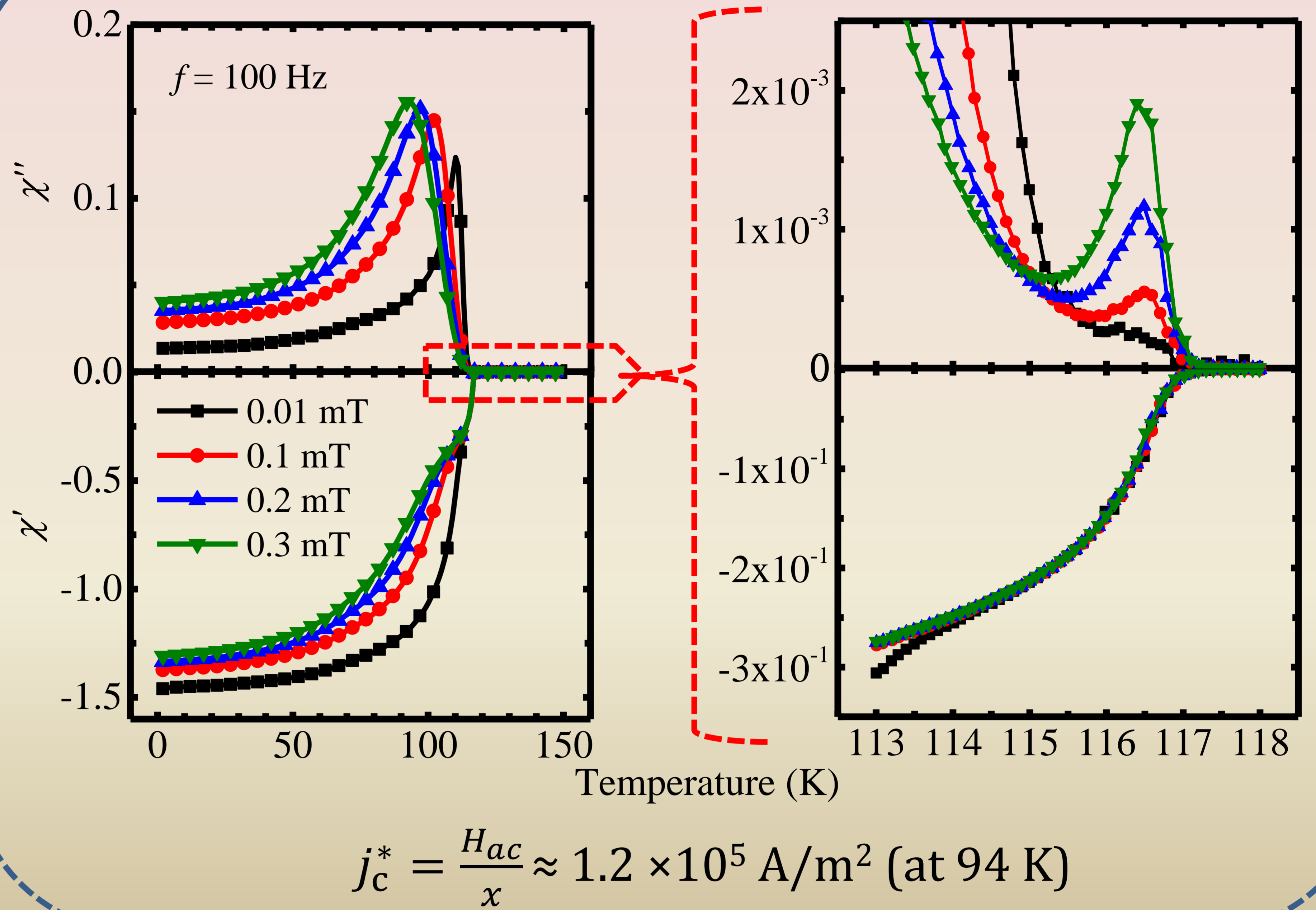
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DC measurements



AC measurements



$$\mu_0 H_{c2} = \frac{\Phi_0}{2\pi\xi^2}$$

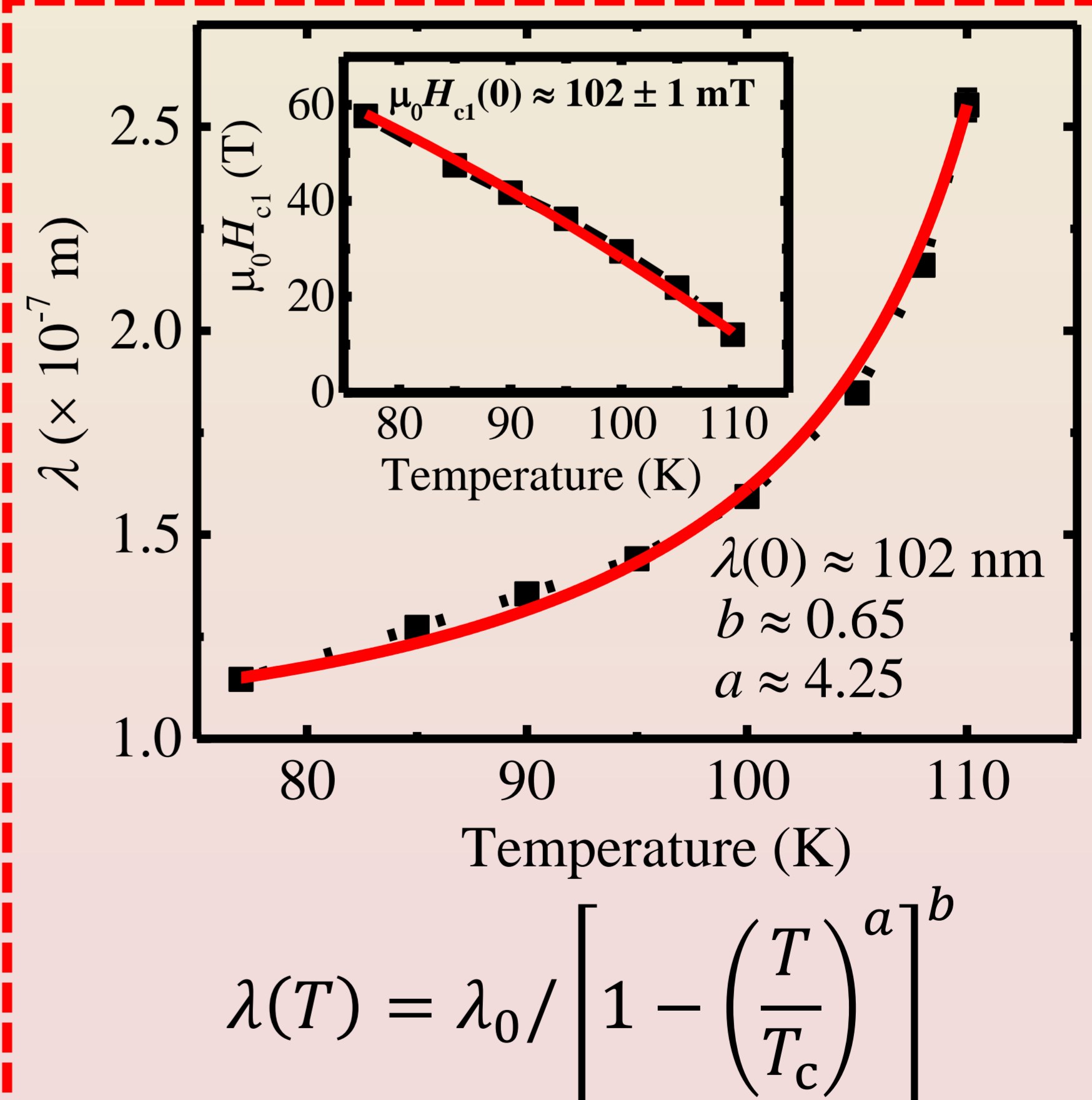
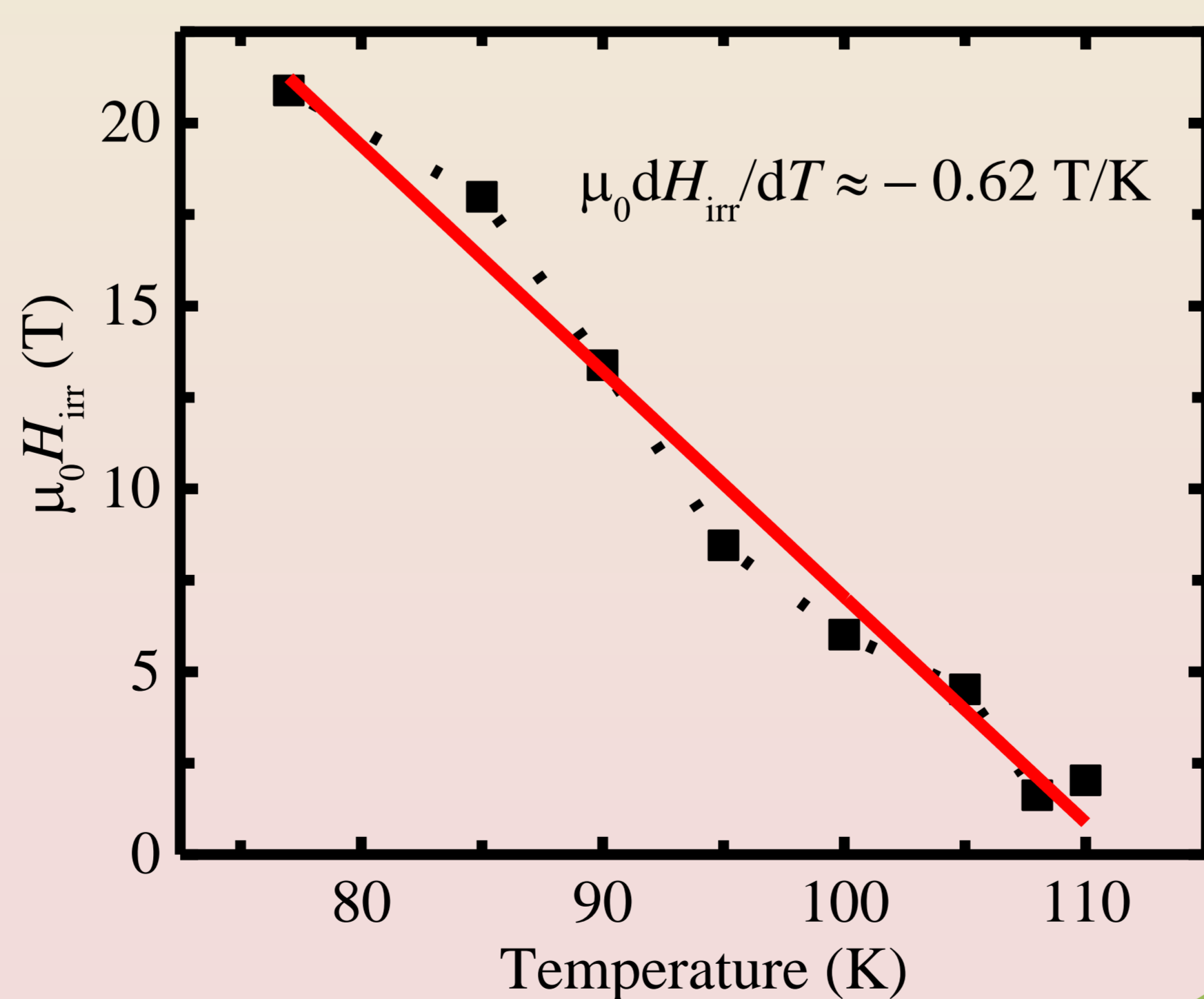
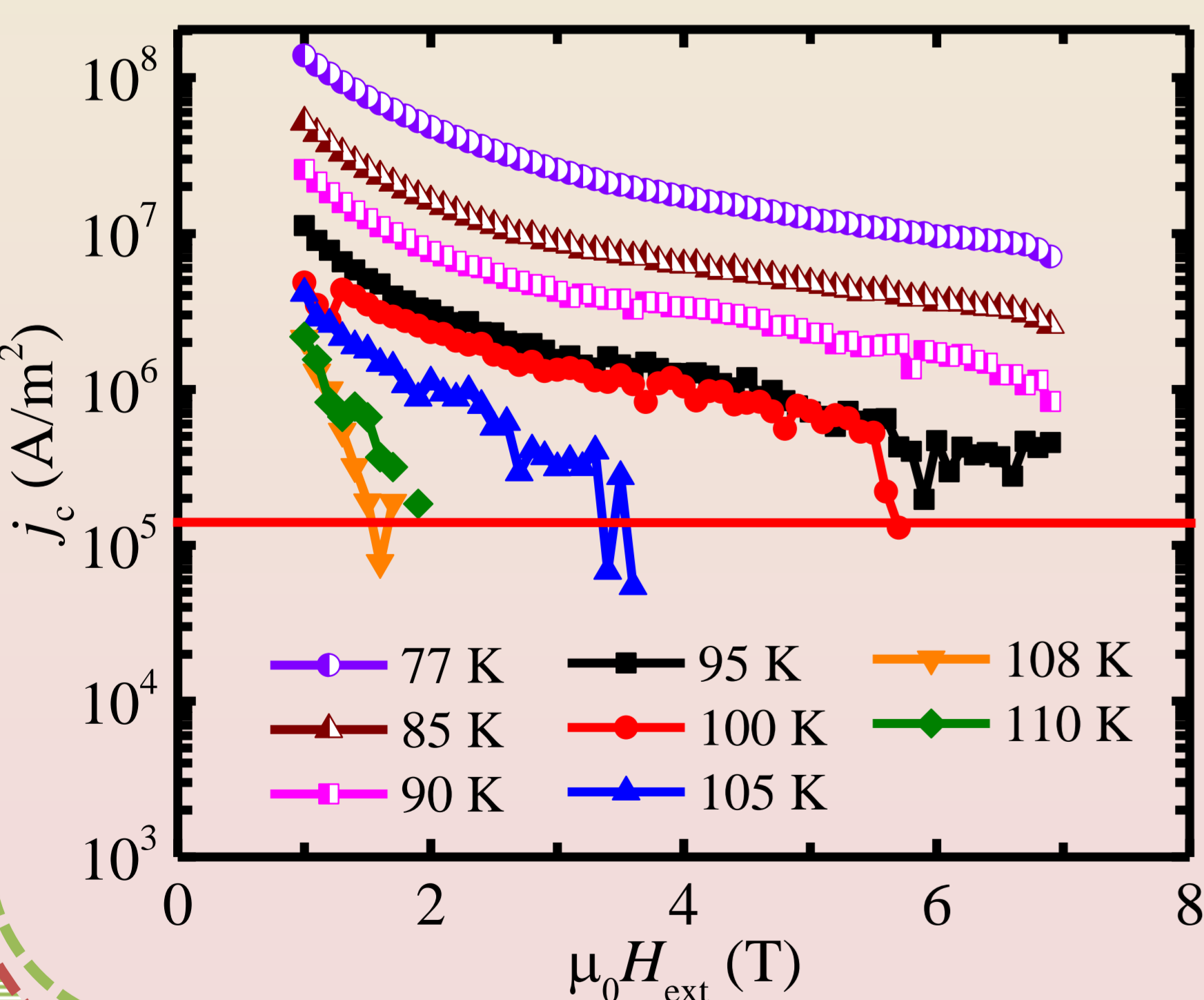
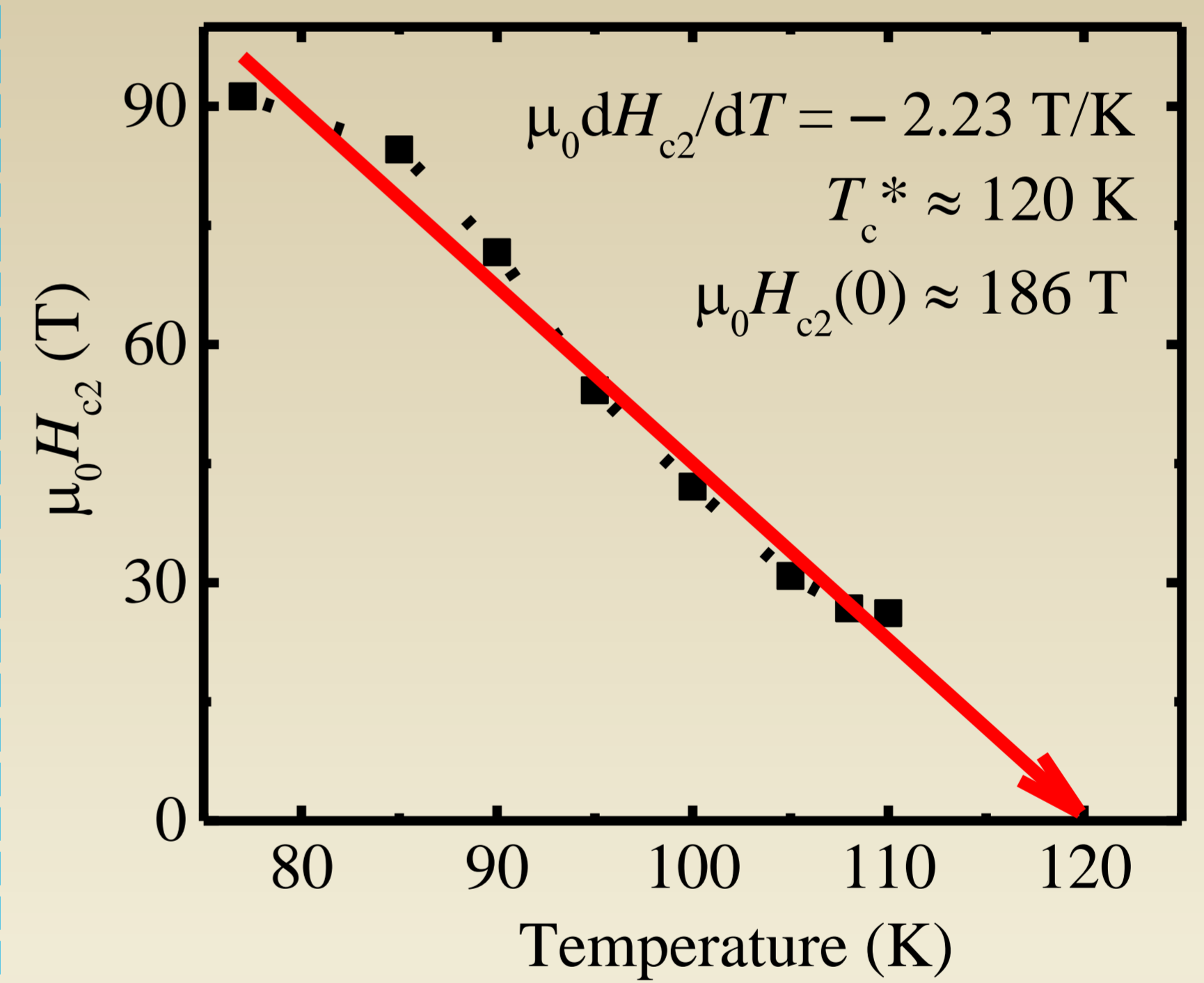
$$\mu_0 H_{c1} = \frac{\Phi_0}{4\pi\lambda^2} \left(\ln\left(\frac{\lambda}{\xi}\right) + 0.5 \right)$$

$$M(H) = -\frac{\Phi_0}{8\pi\mu_0\lambda^2} \left(\ln\frac{\eta H_{c2}}{H} \right)$$

interception

slope

$$\mu_0 H_{c2}(0) = -0.693 \left(\frac{\mu_0 dH_{c2}}{dT} \right) T_c^*$$



$\text{CuBa}_2\text{Ca}_3\text{Cu}_4\text{O}_{10+\delta}$ revealed:

- high $\mu_0 H_{c2}$ of about 91 T at 77 K and $\mu_0 H_{\text{irr}}$ at 77 K as high as 21 T;
- intergranular critical current density is lower by 4 orders of magnitude with regard to intragranular;
- $\xi(0)$ calculated with Ginzburg - Landau relations equals to 1.33 nm ➡ potentially high pinning abilities of point defects. $\lambda(0)$ and related $\mu_0 H_{c1}$ approximately equal to 102 nm and 102 mT respectively.