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Supporting information for article:

Magnetic Guinier Law

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Supplemental Material to "Magnetic Guinier Law"

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Abstract

In this Supplemental Material we provide additional neutron data and an error estimation in support of the above paper.

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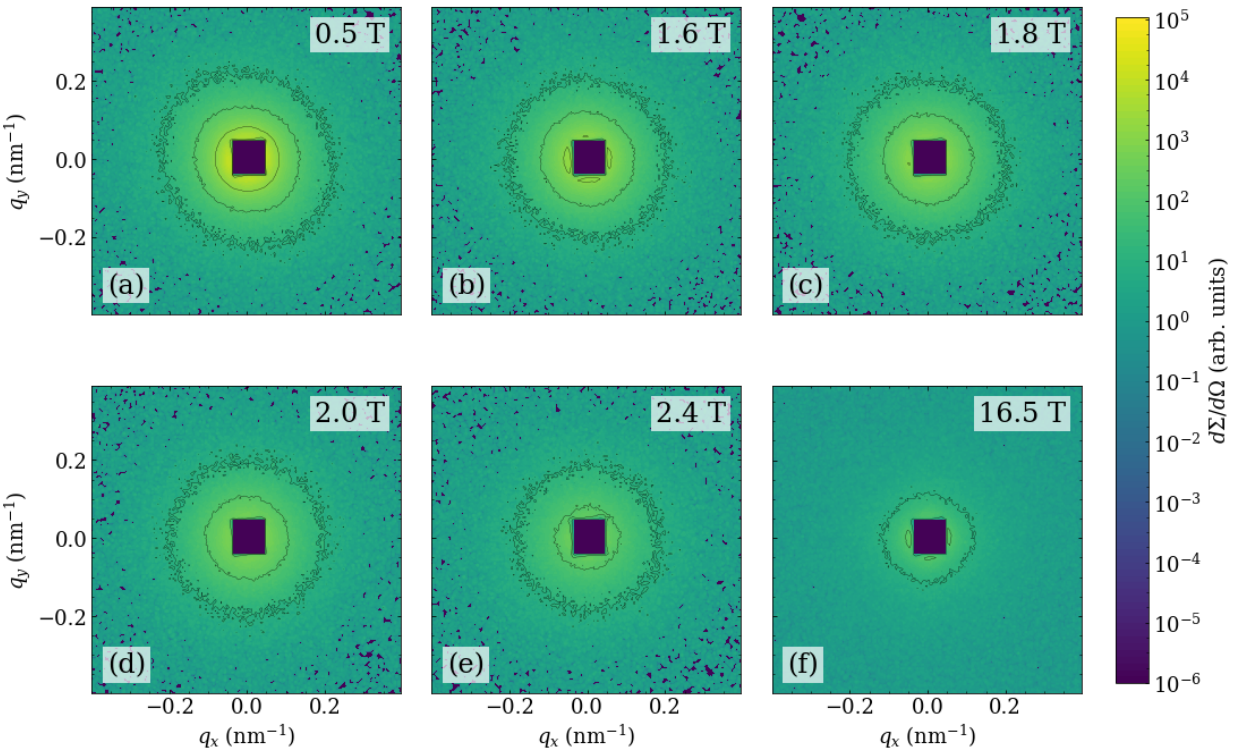

FIG. 1. Two-dimensional unpolarized total (nuclear and magnetic) SANS cross section $d\Sigma/d\Omega$ of nanocrystalline Cobalt at selected applied magnetic fields $\mathbf{H}_0$ (see insets) (logarithmic color scale). $\mathbf{H}_0 \parallel \mathbf{e}_z$ is applied parallel to the wave vector $\mathbf{k}_0$ of the incident neutrons. The average crystallite size of the Cobalt sample is $D = 9.5 \pm 3.0\,\mathrm{nm}$ [1].

[1] J. Weissmüller, A. Michels, J. G. Barker, A. Wiedenmann, U. Erb, and R. D. Shull, Phys. Rev. B **63**, 214414 (2001).

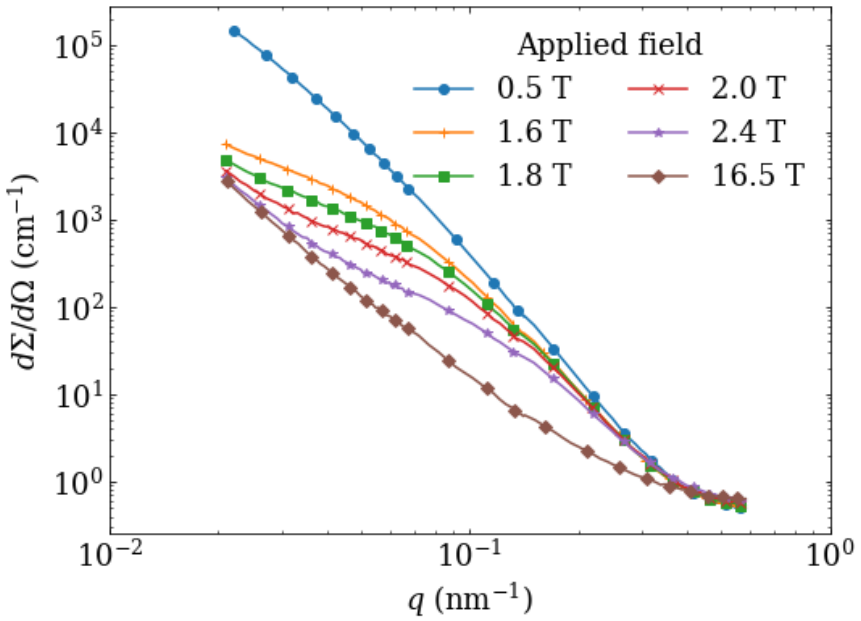

FIG. 2. 2π-azimuthally-averaged $d\Sigma/d\Omega$ data from Fig. 1 (log-log scale). For the clarity of presentation, the number of data points has been reduced.

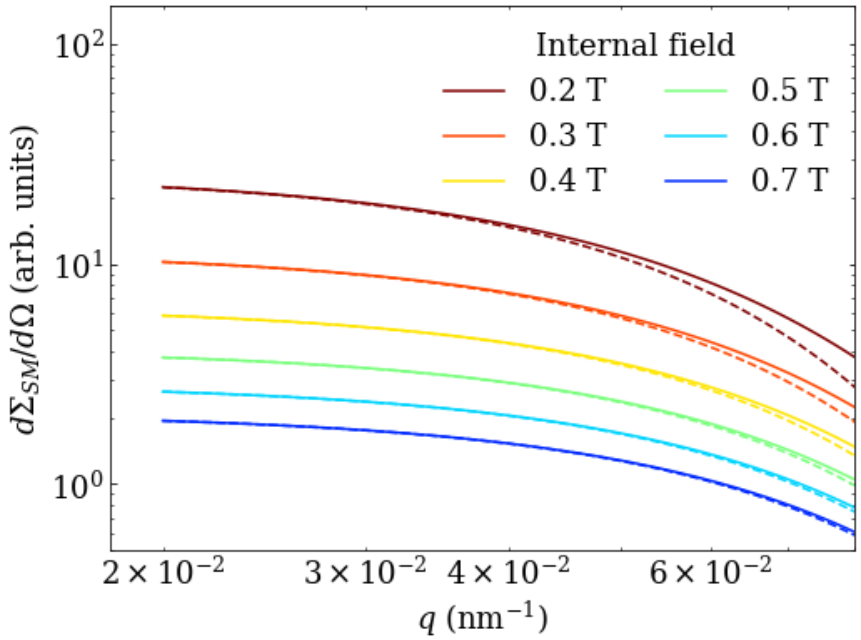

FIG. 3. Comparison between $d\Sigma_{SM}/d\Omega$ (solid lines, Eq. (7) in the paper) and the Guinier approximation [dashed lines, Eqs. (19) and (20)] at selected internal-field values (see inset) (log-log scale). The following materials parameters were chosen: $R_{GH} = 20.5\,\mathrm{nm}$, $A = 1.5 \times 10^{-11}\,\mathrm{J/m}$, $\mu_0 M_s = 1.80\,\mathrm{T}$.

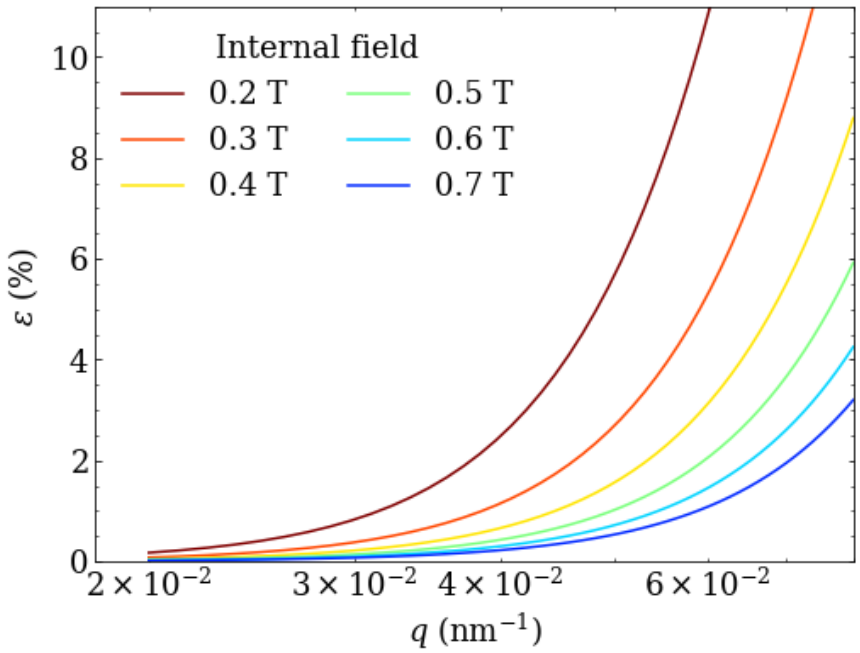

FIG. 4. Relative error of the Guinier approximation. Plotted is the quantity $\epsilon(q, H_i) = \sqrt{(f - f_G)^2}/f$, where $f = d\Sigma_{SM}/d\Omega$ (Eq. (7) in the paper) and f_G is the Guinier approximation [Eqs. (19) and (20)]. The following materials parameters were chosen: $R_{GH} = 20.5\,\mathrm{nm}$, $A = 1.5 \times 10^{-11}\,\mathrm{J/m}$, $\mu_0 M_s = 1.80\,\mathrm{T}$.