Erratum: Quantum-Impurity Relaxometry of Magnetization Dynamics [Phys. Rev. Lett. 121, 187204 (2018)]

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In the presence of an external magnetic field $\mathbf{H} = H\hat{\mathbf{z}}$, Eq. (2) in our Letter should read as

$$\partial_t s_z + \boldsymbol{\nabla}\cdot \boldsymbol{j}_s = -\frac{s_z - \chi\gamma H}{\tau_s}. \tag{1}$$

Equation (3) is modified accordingly as

$$\chi''_{zz}(k,\omega) = \frac{\chi\omega(Dk^2 + 1/\tau_s)}{(Dk^2 + 1/\tau_s)^2 + \omega^2}. \tag{2}$$

Invoking $C_{zz}(k,\omega) = \hbar\coth(\beta\hbar\omega/2)\chi''_{zz}(k,\omega)$, with $C_{zz}(\boldsymbol{r},\boldsymbol{r}';t) = \langle\{\hat{s}_z(\boldsymbol{r}',t),\hat{s}_z(\boldsymbol{r},0)\}\rangle/2$, the resultant quantum-impurity relaxation rate reported in Eq. (4) should be rewritten as

$$\Gamma(\omega) \sim f(\theta)\frac{\chi}{\beta D d^2}\frac{1 + (d/\ell_s)^2}{[1 + (d/\ell_s)^2]^2 + (\omega d^2/D)^2}, \tag{3}$$

where $f(\theta) = \pi(5 - \cos 2\theta)(\tilde{\gamma}\gamma)^2/4$ is the correct geometric prefactor that should enter Eq. (1) of the Letter.

In the close-distance regime of $d \ll \ell_s$, our previous conclusions still hold. When the distance of the quantum impurity from the sample d approaches or exceeds the spin relaxation length ℓ_s, Eq. (3) is modified compared to Eq. (4) in the Letter. A revised Eq. (5) can be derived from Eq. (3) as

$$\ell_s^2 \sim \frac{d_2^4 - d_1^4\Gamma(d_1)/\Gamma(d_2)}{d_1^2\Gamma(d_1)/\Gamma(d_2) - d_2^2}, \tag{4}$$

in terms of the distance-dependent low-frequency relaxation rates Γ. Equation (3) shows that the relaxation rate increases with decreasing frequency, up to $\Gamma \sim (d^2 + d^4/\ell_s^2)^{-1}$, for $\omega \ll D/d^2$. In this regime, one can understand the region with $d \sim \ell_s$ as the crossover between the $\Gamma \sim d^{-2}$ and $\Gamma \sim d^{-4}$ dependencies, as depicted in Fig. 1.

In Eq. (6) of the Letter, $\gamma \to \hbar\gamma$. In Eq. (8) of the Letter, A should be understood as the curvature of the antiferromagnetic dispersion in the long-wavelength parabolic band approximation, i.e., $A = c^2/2\Delta$.

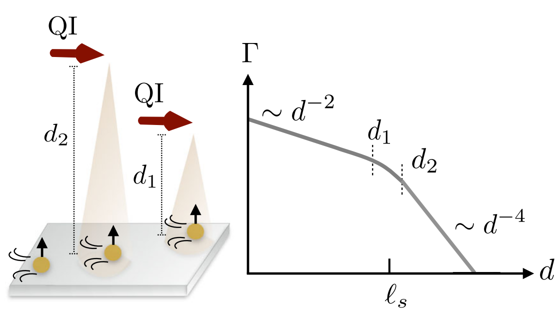

FIG. 1. Revised Fig. 3 of the main text.

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