Erratum: Phase diagram of vortices in high-T_c superconductors from lattice defect model with pinning [Phys. Rev. B 75, 144513 (2007)]

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Our recent paper contains an error in the continous symmetry breaking-solution for the fluid phase. The error is only a factor 1/2, but the consequences are substantial. The factor 1/2 is missing on the left-hand sides of Eqs. (68), (69), and (71). The error has crept in when forming $g''(\Delta)$ from Eq. (58). As a consequence, the full replica symmetry-broken solutions Eqs. (73) and (74) turn into

$$\tilde{\Delta}(s) = \begin{cases} 0 & \text{for } 0 \leq s \leq \dfrac{1}{(\mathcal{D}(0)A)^{1/3}} \\ \dfrac{12}{17}[(\mathcal{D}(0)A)^{1/3}s - 1] & \text{for } \dfrac{1}{(\mathcal{D}(0)A)^{1/3}} \leq s \leq s_c \\ \dfrac{4}{A^2}[(\mathcal{D}(0)A)^{1/3} - 1]^2 & \text{for } s_c \leq s \leq 1 \end{cases} \tag{73}$$

and

$$s_c \approx \frac{1}{(\mathcal{D}(0)A)^{1/3}} + \frac{17}{3}\mathcal{D}^2(0)\frac{((\mathcal{D}(0)A)^{1/3} - 1)^2}{(\mathcal{D}(0)A)^{7/3}}. \tag{74}$$

These change the free energy expression Eq. (75) of the full replica symmetry-broken solution to

$$\Delta f_{\text{var}} = \frac{k_B T}{2}\mathcal{D}_\infty(0)[1 - (\mathcal{D}_\infty(0)A_\infty)^{-1/3}]^3. \tag{75}$$

Remarkably, this result coincides with the the one-step replica symmetry-broken solution in Eq. (64) of our paper. From this we deduce that both the one-step symmetry-broken solution and the continous replica symmetry-broken solution possess a third-order glass transition line. Note that the regime considerations of the stability analysis in Section VII remain unchanged. This is summarized in Table I in this erratum.

The variational free energies replacing Eq. (99) in the solid and Eq. (100) in the liquid phase are given by

$$\Delta f_{\text{var}}^{T\to 0} \approx \frac{k_B T}{2}\mathcal{D}(0)\left[1 - \frac{3}{20}\mathcal{D}^4(0)(\mathcal{D}(0)A)^{-3}\right] \quad \text{BG phase}, \tag{99}$$

$$\Delta f_{\text{var}}^{T\to\infty} \approx \frac{k_B T}{2}\mathcal{D}_\infty(0)[1 - (\mathcal{D}_\infty(0)A_\infty)^{-1/3}]^3\Theta[\mathcal{D}_\infty(0)A_\infty - 1] \quad \text{VG-VL phase}. \tag{100}$$

Here we assume that Eq. (100) is also valid in the small finite-step replica symmetry-breaking regime $1-20/6A_\infty^2 \leq \kappa_1[K] \leq 1-17/6A_\infty^2$ as discussed in Section VII. From this result, we obtain that only Fig. 5 and Fig. 6 are changed such that the calculated curves in the continous replica symmetry-broken solution in the regime $\kappa_1[K] > 1-17/6A_\infty^2$ are given by the curves for $\kappa_1[K] \leq 1-20/6A_\infty^2$ also shown in the figures. For completeness, we redraw both figures here.

Note that in both regimes the vortex fluctuations are still given by $u^2(0,L_3) \propto (k_B T)L_3/c_{44}a^2$ for $L_3 \to \infty$ where the proportionality factors are different.

TABLE I. Stable saddle points of Eq. (36) as a function of the kurtosis $\kappa_1(K)$ in Eq. (85) of the disorder correlation function K in real space. The second line of the table denotes the character of the stable solution of Eq. (50). The third line indicates the order of the VG-VL transition.

$\kappa_1[K]$	$\leq 1-20/6A_\infty^2$	$> 1-17/6A_\infty^2$
saddle point	one-step breaking	continuous breaking
order of transition	third order	third order

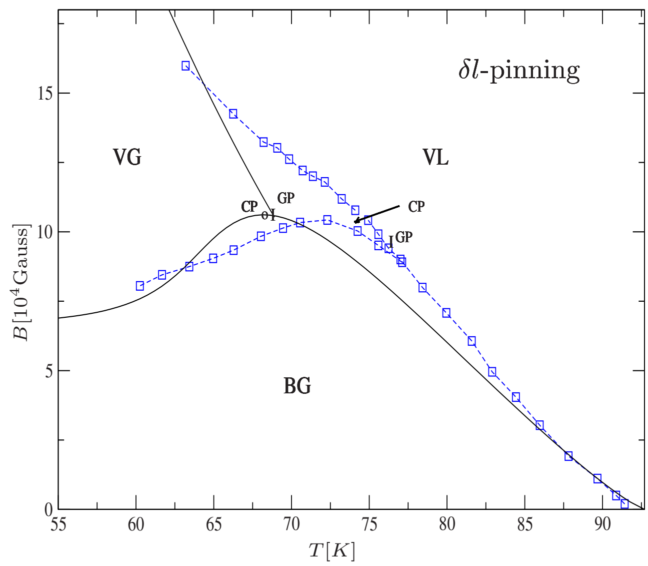

FIG. 5. (Color online) Phase diagram for YBCO. Solid lines represent the theoretical determined phase transition lines between the various phases calculated for δl-pinning with $2\pi d_0 \xi_{ab}^2/\xi'^2 = 1.32 \cdot 10^{-6}$ and $\xi_{ab}/\xi' = 1.49$ corresponding to the solid line in the lower picture in Fig. 4. The glass transition line VG-VL was calculated from Eq. (102). Square points represent the experimentally determined phase diagram of Bouquet *et al.*[1]

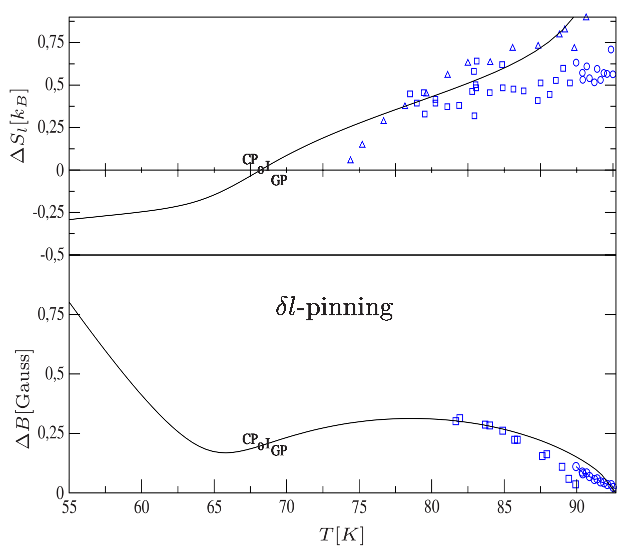

FIG. 6. (Color online) In the upper figure we show the entropy jump ΔS_l per double layer and vortex according to (104). The points in the figure are entropy jumps determined by experiments (circles,[2] squares,[3] triangles[1]). In the lower figure we show the magnetic induction jumps ΔB calculated by the help of Eq. (106). Experimental points in this figure are from Ref. 2 (circles) and Ref. 4 (squares). The solid curves in both figures correspond to the jumps over the BG-VG, BG-VL line. We used for the whole figure parameter values $2\pi d_0 \xi_{ab}^2/\xi'^2 = 1.32 \cdot 10^{-6}$ and $\xi_{ab}/\xi' = 1.49$ in correspondence to the parameter values in Fig. 5.

Summarizing, we obtain now a third-order glass transition line in *both* disorder correlation regimes in the fluid phase, rather than just in the one-step replica symmetry-breaking regime of Table I. This agrees with experiments and computer simulations for the disorder phase correlation exponent ν leading to a third- (or even higher-) order glass transition as was argued in our paper.

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