SUPPLEMENTARY MATERIAL

In this supplementary part we collect some transport data which might be helpful for comparison and characterization with other As-deficient samples to be possibly prepared and investigated by other authors in the future.

S1 Hall data

The field dependency of the Hall resistivity ρ_{xy} of the As-deficient sample shown in figure 13 (left) at $T_c \leq T \leq 110$ K reveals a linear dependence of ρ_{xy} on the applied magnetic field H and a slight temperature dependence of the slope ρ_{xy}/H. The resulting Hall coefficient $R_H = \rho_{xy}/\mu_0 H$ deviates from that known for optimal doped samples, as shown in figure 13 (right).

From the Hall coefficient, the carrier density n_H has been estimated within the single band approach both for optimally and underdoped $LaF_xO_{1-x}FeAs$ [S1,26,35,38] using the relation $n_H = (e \mid R_H \mid)^{-1}$. Within this approach a charge carrier density of $n_H = 0.52 \cdot 10^{21}\mathrm{cm}^{-3}$ is estimated at $T = 30$ K for the As-deficient sample, which is comparable to $n_H = 0.55 \cdot 10^{21}\mathrm{cm}^{-3}$ reported for underdoped $LaF_xO_{1-x}FeAs$ with x = 0.05 [38], but only half as large as $n_H \approx 1.0 \cdot 10^{21}\mathrm{cm}^{-3}$ [S1,26,35] reported for optimally doped $LaF_xO_{1-x}FeAs$ with $x = 0.1$. The reduced carrier density of the As-deficient sample points to a reduced doping level of $x = 0.05$ of this sample instead of $x = 0.1$ expected from its F content. This is consistent with the observed enhancement of the lattice parameters of this sample which are close to those reported for $x = 0.5$.

S2 Scaling analyzis of the resistivity

In order to get more insight in relevant scattering mechanisms we performed a scaling analysis of the resistivity $\rho(T)$ data from T_c up to 300 K. Such an analysis is also helpful to classify our sample with respect to other underdoped and overdoped samples of the

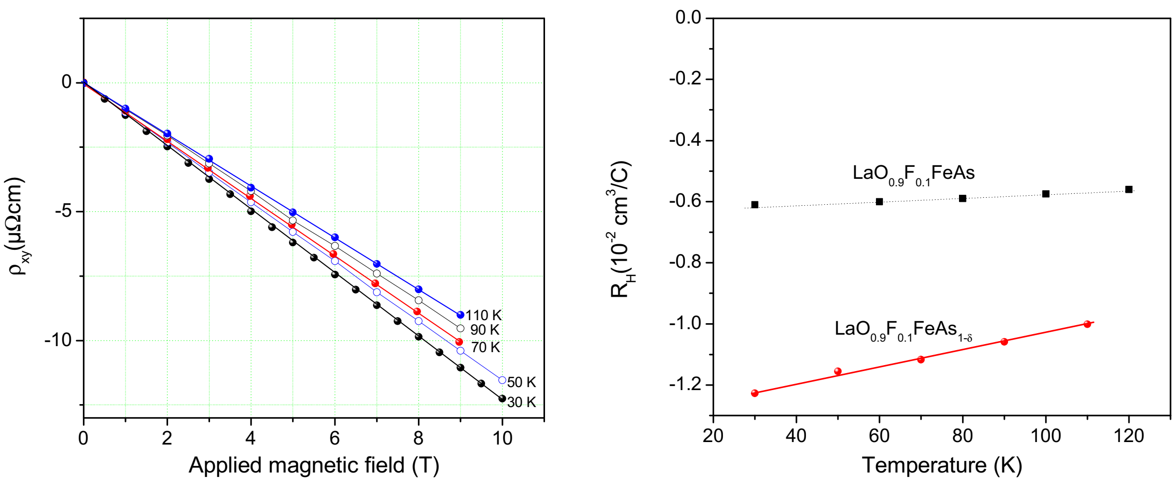

Figure 13. Field dependence of the Hall resistivity for the As-deficient sample (left). Temperature dependence of the Hall coefficient (right) for the As-deficient sample (●) and a clean sample (■)as taken from reference [38].

Table 2. Scaling analysis of the resistivity $\rho(T)$ according to equation (S2,1), where ρ_0 denotes the residual resistivity and Δ is a pseudo-gap-like quantity.

Samples	ρ_0 ($\mu\Omega$cm)	ρ(300 K)/ρ_0	Δ (K)	C ($\mu\Omega$cm/K)
$LaO_{0.9}F_{0.1}FeAs_{1-\delta}$ ($\delta = 0$)	210.0	10.95	164	12.5
$LaO_{0.9}F_{0.1}FeAs_{1-\delta}$ ($\delta \approx 0.05$ to 0.1)	605.6	6.6	114	18.5

same La-1111 family. For that purpose we employed the following expression for the resistivity $\rho(T)$ which has been used for cuprate HTSC [S2,S3,S4,S5]

$$\rho = \rho_0 + CT\exp\left(-\frac{\Delta}{T}\right), \qquad (S2,1)$$

where ρ_0 is the residual resistivity and Δ is a characteristic energy determined from the nonlinear part of $\rho(T)$. Expression (S2,1) fits nicely our data (see figure 14 (left). The obtained fit parameters ρ_0, C, and Δ are shown in table 2. Our values of Δ are about 14 and 10 meV at $\delta = 0$ and $\delta = 0.05$ to 0.1, respectively. Noteworthy, the former value is in accord with the so-called pseudo gap of 15-20 meV reported by Sato *et al.* [S6] and Garcia *et al.* [S7] These estimates are based on high-resolution photoemission spectroscopy data for $LaO_{0.93}F_{0.07}FeAs$ and $LaO_{0.9}F_{0.1}FeAs$, respectively. Both curves depicted in figure 15 (left) can be lumped into a single curve as illustrated in figure 14 (right), if one plots $(\rho - \rho_0)/(\rho(\Delta) - \rho_0)$ against T/Δ, where $\rho(\Delta)$ is the resistivity at $T = \Delta$. The resulting curve is approximately linear with T for $1.5 \geq T/\Delta \geq 0.8$

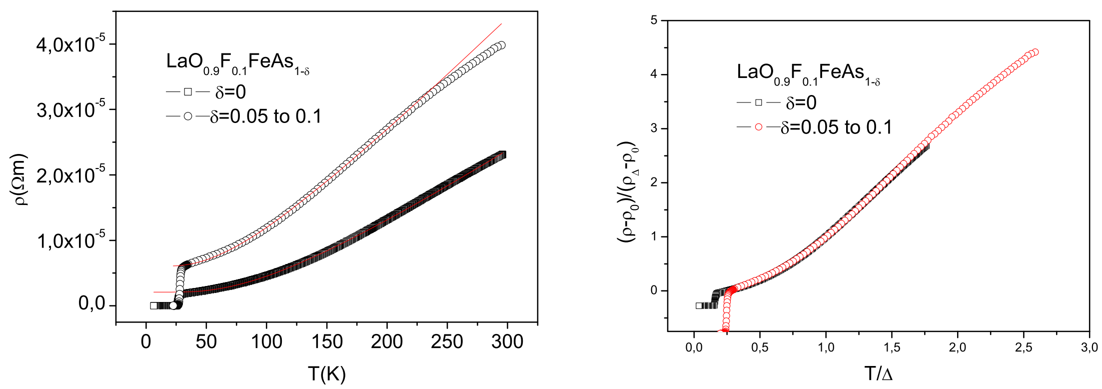

Figure 14. Temperature dependence of the resistivity ρ for an As-deficient and a nondeficient clean reference sample (left). The solid line represents a fit using equation (S2,1). The same as in the left part with eliminated residual resistivity ρ_0 and normalized in an appropriate way (see text) (right).

(see figure 14 (right)). At lower temperatures the $\rho(T)$-curves deviate from linearity and a superlinear $\rho(T)$-behavior sets in. A similar behaviour has been reported for underdoped $YBa_2Cu_3O_{7-y}$ [S2,S3,S4] The existence of a universal metallic $\rho(T)$-curve points to a single mechanism which dominates the scattering of the charge carriers in these materials. A more detailed scaling analysis will be given elsewhere [S8].

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