

Table S1 Refined cell parameters, agreement factors, atomic parameters and selected bond lengths and angles for LaOMnAs at various temperatures. La and As are in 2c ($\frac{1}{4}, \frac{1}{4}, z$), Mn in 2b ($\frac{3}{4}, \frac{1}{4}, \frac{1}{2}$) and O in 2a ($\frac{1}{4}, \frac{3}{4}, 0$).

Atom	Occupancy		Temperature (K)	
			290	400
La	1.00	z	0.13264(4)	0.13242(4)
		$U_{\text{iso}} (\text{\AA}^2)$	0.00398(7)	0.00588(10)
Mn	1.00	$U_{\text{iso}} (\text{\AA}^2)$	0.00643(12)	0.00864(16)
		$m_z (\mu_B)$	2.434(12)	-
As	1.00	z	0.66842(5)	0.66842(6)
		$U_{\text{iso}} (\text{\AA}^2)$	0.00730(11)	0.01002(14)
O	1.00	$U_{\text{iso}} (\text{\AA}^2)$	0.00651(9)	0.00834(12)
		a (Å)	4.11880(4)	4.12361(5)
		c (Å)	9.04414(11)	9.05488(12)
		χ^2 (%)	1.103	1.333
		R_{WP} (%)	3.13	1.27
		R_p (%)	5.14	2.21
		La-O (Å)	2.38330(17)	2.38510(19)
		Mn-As (Å)	2.5615(3)	2.5645(3)
		Mn-Mn (Å)	2.91243(3)	2.91584(3)
		α_1 (La-O-La) ($^\circ$)	119.559(14)	119.641(16)
		α_2 (La-O-La) ($^\circ$)	104.675(6)	104.639(7)
		α_1 (As-Mn-As) ($^\circ$)	110.708(9)	110.709(10)
		α_2 (As-Mn-As) ($^\circ$)	107.025(17)	107.023(20)

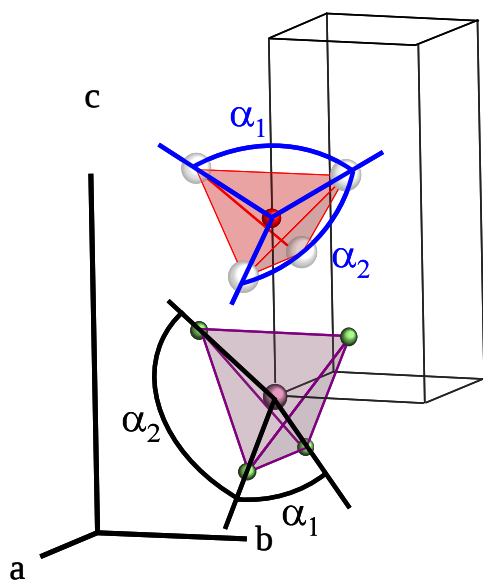


Table S1: Refined cell parameters, agreement factors, atomic parameters and selected bond lengths and angles for NdMnAsO at various temperatures. Nd and As are in 2c ($\frac{1}{4}, \frac{1}{4}, z$), Mn in 2b ($\frac{3}{4}, \frac{1}{4}, \frac{1}{2}$) and O in 2a ($\frac{1}{4}, \frac{3}{4}, 0$).

Atom	Occupancy		Temperature (K)	
			290	400
Nd	1.00	z	0.12963(6)	0.12947(10)
		$U_{\text{iso}} (\text{\AA}^2)$	0.00202(8)	0.00407(16)
Mn	1.00	$U_{\text{iso}} (\text{\AA}^2)$	0.00655(21)	0.0094(4)
		$m_z (\mu_B)$	2.353(20)	-
As	1.00	z	0.67459(9)	0.67411(13)
		$U_{\text{iso}} (\text{\AA}^2)$	0.00567(15)	0.0084(3)
O	1.00	$U_{\text{iso}} (\text{\AA}^2)$	0.00489(14)	0.0071(2)
		a (Å)	4.050594(15)	4.05503(8)
		c (Å)	8.90497(15)	8.91700(21)
		χ^2 (%)	1.009	1.020
		R_{WP} (%)	1.81	1.00

R_p (%)	3.78	2.16
Nd-O (Å)	2.3312(3)	2.3331(4)
Mn-As (Å)	2.5532(5)	2.5537(7)
Mn-Mn (Å)	2.864200(10)	2.86734(6)
α_1 (Nd-O-Nd) ($^\circ$)	120.64 (3)	120.69(4)
α_2 (Nd-O-Nd) ($^\circ$)	104.193(11)	104.172(16)
α_1 (As-Mn-As) ($^\circ$)	111.764(15)	111.69(2)
α_2 (As-Mn-As) ($^\circ$)	104.98(3)	105.12(4)

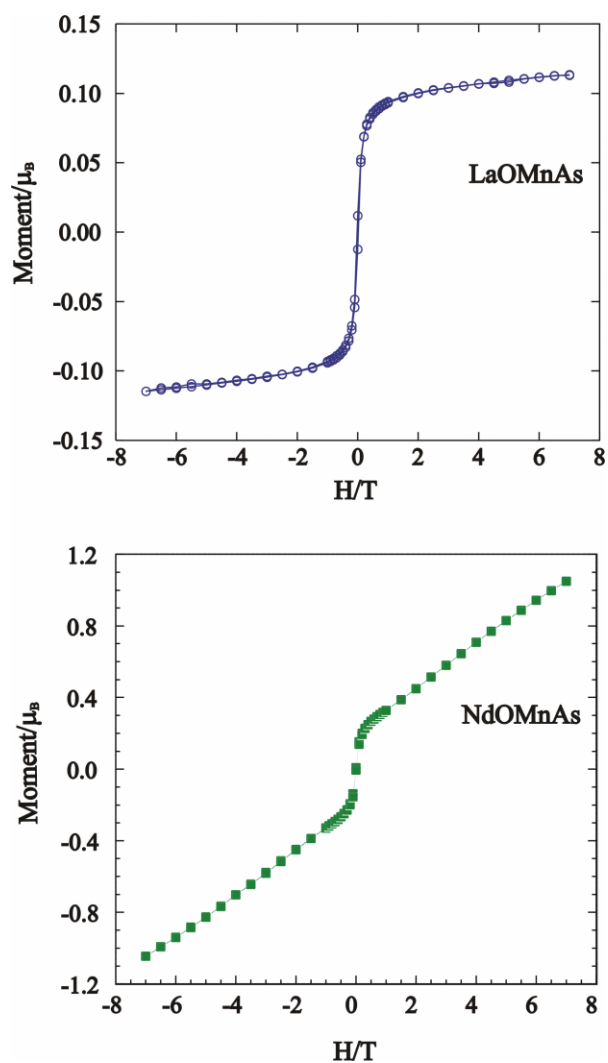


Figure S1 Variation of magnetisation with field for LaOMnAs and NdOMnAs at 2 K.

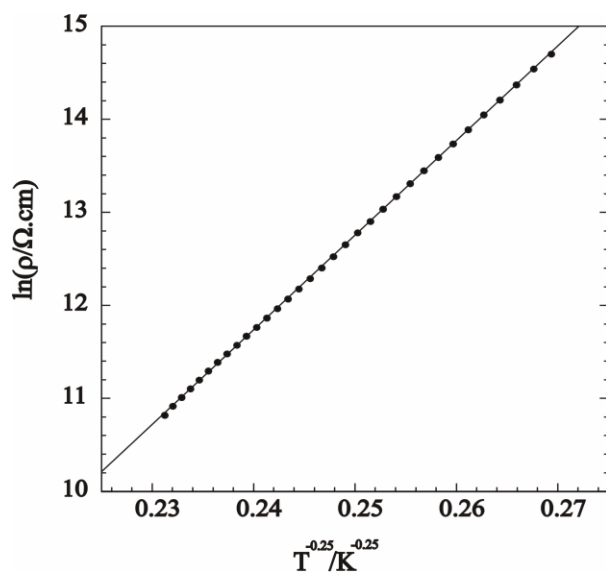


Figure S2 Plot of $\ln(\text{resistivity})$ against $T^{-1/4}$ for LaOMnAs ; the resistivity is fit to the Mott VRH equation $\rho = \rho_0 \exp(T_0/T)^{1/4}$.