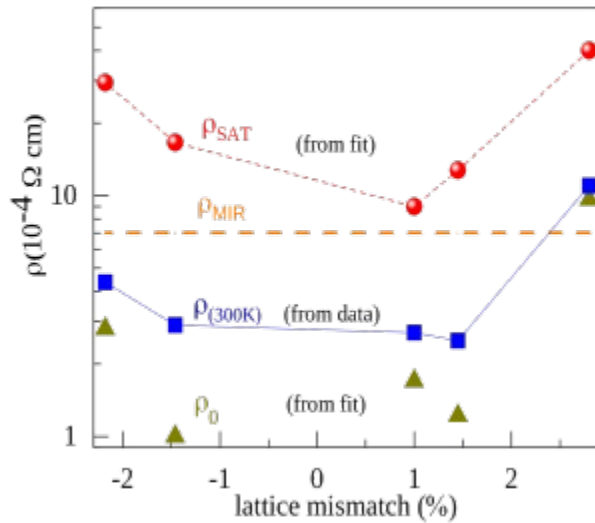


### Strain-mediated effects of oxygen deficiency and variation in non-Fermi liquid behavior of epitaxial PrNiO<sub>3-δ</sub> thin films:



The difference of oxygen content caused a different state of epitaxial strain in PrNiO<sub>3-δ</sub> (PNO) films. The epitaxial strain which was induced in the films due to lattice mismatch with the substrate got further modified by oxygen variation in the stoichiometry. The metallic PNO films show non-Fermi liquid (NFL) behavior. The resistivity fittings to power-law equation [  $\rho^{-1}(T) = \rho_{NFL}^{-1}(T) + \rho_{sat}^{-1}$  , where  $\rho_{NFL}(T) = \rho(0) + AT^n$  ] show a systematic tuning of NFL fitting

parameters. The given figure shows variations in the fitting parameters  $\rho_{SAT}$ ,  $\rho(300)$  and  $\rho(0)$  with change in lattice mismatch for PNO films induced by substrate and the oxygen content. Dashed line is the calculated Mott–Ioffe–Regal limit of resistivity ( $\rho_{MIR} = 0.7 \text{ m}\Omega \cdot \text{cm}$  for the present system). These results show that, not only the ‘lattice mismatch induced strain’, but also the oxygen content of the films via strain-modification can further tune NFL behavior of perovskite nickelates as shown in the figure. For this study, three sets of PrNiO<sub>3-δ</sub> thin films (S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub>) were deposited on (001) oriented single-crystal wafers of, respectively, SrTiO<sub>3</sub>, LSAT [(LaAlO<sub>3</sub>)<sub>0.3</sub>(Sr<sub>2</sub>TaAlO<sub>6</sub>)<sub>0.7</sub>] and LaAlO<sub>3</sub>. Two sets of films, S<sub>1</sub> and S<sub>2</sub>, have tensile strain whereas the films of S<sub>3</sub> show compressive strain. For each set, two thin films of fixed thickness (5 nm) were deposited; one film was in-situ annealed in oxygen partial pressure just after deposition and another film was not annealed.

[FOR DETAILS SEE : <https://doi.org/10.1088/1361-648X/aafd66>]