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**Scanning tunneling spectroscopy study of charge ordering, stripes and phase separation in manganese perovskite oxides.**

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Colossal magnetoresistance (CMR) in perovskite-based transition metal oxides keeps challenging our understanding. Constant progress in scanning tunneling microscopy investigations is enabling increasingly detailed experimental insight into the different electronic and structural phases nucleating in these complex materials. I shall review the latest findings emerging from experiments on perovskite- and bilayer-manganites [1], which in particular, reveal the importance of lattice degrees of freedom (polarons) and their contribution to the macroscopic transport properties. I shall also discuss the observation of an unexpected hexagonal phase, glimpses of a stripe phase and, finally, address the question of phase separation in these systems.

[1] Ch.Renner and H.M.Rønnow, "Scanning tunneling microscopy and spectroscopy of manganites" in Scanning Probe Microscopy: Electrical and Electromechanical Phenomena at the Nanoscale, Springer Series, (2006).