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### **Hourglass dispersion in overdoped single-layered manganites**

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Two non-metallic single-layered manganites with a doping level well above half doping,  $\text{Nd}_{0.33}\text{Sr}_{1.67}\text{MnO}_4$  and  $\text{Pr}_{0.33}\text{Ca}_{1.67}\text{MnO}_4$ , exhibit an incommensurate ordering of magnetic, charge and orbital degrees of freedom. Inelastic neutron scattering experiments reveal an hourglass-like excitation spectrum very similar to that seen in various cuprates superconductors, but only for sufficiently short correlation lengths. We find the characteristic features of the hourglass dispersion as the enhanced intensity at the merging of the incommensurate branches, the rotation of intensity maxima at higher energy, and suppression of the outwards-dispersing branches at low energies. The correlation length of the magnetic ordering and the large ratio of intra- to inter-stripe couplings can be identified as the decisive parameters causing the hourglass shape of the spectrum.

<sup>1</sup>Work performed in collaboration with H. Ulbrich, P. Steffens, D. Lamago, and Y. Sidis