German Conference for Research with Synchrotron Radiation, Neutrons and Ion Beams at Large Facilities



Contribution ID: 412

Type: Poster

Structural and electronic correlation in hole-doped Pr2-xSrxNiO4+d

Tuesday, 18 September 2018 16:30 (15 minutes)

Co-doped Pr2-xSrxNiO4+d is one of the exotic family members belonging to the nickelets for many different reasons. Like h-Tc cuprates and cobaltates superconductors, this family of nickelets also shows very complicated incommensurability (epsilon) of charge and spin ordering which can be explained via dis-commensuration/mixing of stripe and checkerboard ordered phases. In addition to that, the high oxygen mobility, which has been explained in this compound via phonon assisted diffusion mechanism, give rise to intriguing complexity as the interstitial oxygen gets ordered on a very long range scale giving O-supercell volume of approximately (70.000 Angstrom^3). A series of compounds including pure sr-doped Pr1.5Sr0.5NiO4, co-doped Pr1.875Sr0.125NiO4+d and oxygen doped Pr2NiO4.25 have been investigated by synchrotron and neutron scattering. The preliminary findings show in all cases different incommensurability though the nominal hole concentration (nh=x+2d) is expected to be the same. The oxygen containing samples show in-plane incommensurate modulation with vector ~ q(0.521,0.805,0) with satellites detected upto 4th order. We will discuss Pr2-xSrxNiO4+d a perfect model system to show the effect of oxygen ordering on the charge and spin correlations and their related excitations.

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Session Classification: Poster session 2

Track Classification: P4 Magnetism and quantum phenomena