# Experimental Report



**Proposal:** **7-01-382** **Council:** 10/2012

**Title:** Systematic study of electron phonon coupling in La2-xSrxNiO4

**This proposal is a new proposal**

**Researh Area:** Physics

**Main proposer:** **KOMAREK ALEXANDER CHRISTOPH**

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**Samples:** La2-xSrxNiO4

| Instrument | Req. Days | All. Days | From | To |
|---|---|---|---|---|
| IN8 | 5 | 5 | 03/07/2013 | 09/07/2013 |
| IN3 | 0 | 3 | 28/06/2013 | 01/07/2013 |

**Abstract:**

Recently, a “hour-glass” magnetic excitation spectrum has been found in the cobaltates that resembles on the famous magnetic excitation spectra in the isostructural HTSC cuprates. This discovery has re-attracted enormous interest to the physics of charge stripe phases. Here, we are interested in the electron phonon coupling in charge stripe ordered phases and propose to study the longitudinal bond stretching phonon modes (high-frequency Sigma_1 phonon mode) in La2-xSrxNiO4 (LSNO). So far two conflictive observations have been made in ~1/3 doped and ~0.25 hole-doped LSNO. Hence, the study of other Sr-concentrations seems highly desirable now. We were able to grow stoichiometric 14%-doped LSNO single crystals that exhibit distinctly lower incommensurabilities e (e=0.14 << 0.25) than in the other two hitherto studied LSNO samples and surprisingly also the basic features of a “hour-glass” excitation spectrum. In order to study the effect of electron phonon coupling systematically in LSNO we further propose to measure 40%, 50% and 70% Sr-doped LSNO with substantially different charge ordering propagation vectors. For all these purposes we ask for 5 days at the IN8 spectrometer.

# Systematic study of electron phonon coupling in $La_{2-x}Sr_xNiO_4$

Experimental Team: Z. W. Li, Y. Drees, W. Schmidt and A. Piovano

The experiment was proposed to study the electron phonon coupling in La2-xSrxNiO4. The Cu monochromator was necessary in order to measure high-frequency phonon modes around 80 meV for studying electron phonon coupling in La2-xSrxNiO4. However, the Cu monochromator was not available during our beamtime at the IN8 spectrometer and it was not clear when it would have been available again. Hence, after discussion with our beamline scientist we decided to measure something else that could be measured with a PG monochromator and that we were able to, finally, use in a publication,

see Y. Drees, *et al*., Nat. Commun. **5**, 5731 (2014).