We have developed a new method to analyze the ARPES data - namely Autocorrelation Analysis. Autocorrelation of ARPES data basically maps out joint density of states profile in the momentum space. Since ARPES probes the momentum space directly, the features in the Autocorrelation intensity maps (so called q-space) correspond to elastic momentum transfer vectors. We have used this technique in both SC and normal state of Cuprates and compared with recent Fourier Transformed Scanning Tunneling Spectroscopy (FT-STS) findings in Cuprates.

Recently FT-STS study in the SC states of cuprates show well defined dispersive features in q space. Since STM is a probe in real space, one needs to invoke some sort of model to explain these features. And it turns out that Octet model does the job very well in the SC state. Autocorrelation of the ARPES data shows similar features, that are in qualitative and almost quantitative agreement with STM findings.

When the FT-STS technique is applied to the PG state, it turns out that unlike SC State, the q space pattern in PG state is almost non dispersive. To explain this non-dispersive structure a charge ordering mechanism has been proposed. When we apply Autocorrelation method in the PG state we see similar dispersion less feature in the q space pattern. Hence we argue just like SC State FT-STS feature in PG state can be understood from joint density of states profile in the momentum space.

Measurements were carried out at U1 beam line at SRC using Scienta SES50 and SES2002 analyzers.

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References: