

**Speaker:** Prof. Arup Bose, Indian Statistical Institute, Kolkata

**Title:** Large sample behaviour of high dimensional autocovariance matrices with application

**Abstract:** Consider a sample of size  $n$  from a linear process of dimension  $p$  where  $n, p \rightarrow \infty$ ,  $p/n \rightarrow y \in [0, \infty)$ . Let  $\hat{\Gamma}_u$  be the sample autocovariance of order  $u$ .

We prove, in a unified way, that the limiting spectral distribution (LSD) of any symmetric polynomial in these matrices such as  $\hat{\Gamma}_u + \hat{\Gamma}_u^*$ ,  $\hat{\Gamma}_u \hat{\Gamma}_u^*$ ,  $\hat{\Gamma}_u \hat{\Gamma}_u^* + \hat{\Gamma}_k \hat{\Gamma}_k^*$  exist.

Our approach is through the intuitive algebraic method of free probability in conjunction with the method of moments. Thus, we are able to provide a general description for the limits in terms of some freely independent variables.

We suggest statistical uses of these LSD and related results in problems such as order determination and white noise testing.

The ideas extend to several independent processes and is useful for statistical tests in to-sample problems.