SCHOOL OF DATA SCIENCE

# SEMINAR SERIES

## Identification of the number of factors for High dimensional time series

Date: 13 November 2018 (Tuesday)
Time: 10:00am to 11:00am
Venue: P7510, 7/F, Yeung Kin Man Academic Building (YEUNG), City University of Hong Kong


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### *Guest Speaker's profile*

I am Zeng Li, currently an Eberly Research Fellow in the Department of Statistics, The Penn State University. My mentor is Prof. Runze Li, the Verne M. Willaman Professor in PSU. I received my Ph.D. in Statistics from the University of Hong Kong in 2017. My research interests include in random matrix theory and its applications to high dimensional statistical problems, including regression, classification and other inference problems in time series analysis. During my Ph.D. study, I focused on spectral analysis of large sample auto-covariance matrices of high dimensional time series and published in top statistics journals.


### *Abstract*

Identifying the number of factors in a high-dimensional factor model has attracted much attention in recent years and a general solution to the problem is still lacking. A promising ratio estimator based on singular values of lagged sample auto-covariance matrices has been recently proposed in the literature with a reasonably good performance under some specific assumption on the strength of the factors. Inspired by this ratio estimator, we have developed a complete theory of such sample singular values for both the factor part and the noise part under the large dimensional scheme where the dimension and the sample size proportionally grow to infinity. In this talk, I will provide an exact description of the theory derived and the phase transition phenomenon that determines whether a factor is strong enough to be detected with the observed sample singular values. Based on these findings, I will present a new estimator of the number of factors which is strongly consistent for the detection of all significant factors (which are the only theoretically detectable ones). In particular, factors are assumed to have the minimum strength above the phase transition boundary which is of the order of a constant; they are thus not required to grow to infinity together with the dimension (as assumed in most of the existing papers on high-dimensional factor models). Empirical Monte-Carlo studies will also be shown to justify the good performance of the proposed estimator.


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All are welcome