EO691 Room 309 B ORDER RESTRICTED INFERENCE Chair: Ori Davidov

EO0555: **Detection of rhythmic signals in oscillatory systems using order restricted inference**
Presenter: **Miguel Fernandez**, Universidad de Valladolid, Spain
Co-authors: Yolanda Larriba, Cristina Rueda, Shyamal Peddada
The determination of rhythmic signals in oscillatory systems, such as cell cycle or circadian clock, is essential for biologists to know which genes are associated to the system. While there are several procedures available for this task in the literature, none of them is satisfactory enough. One of the reasons for this is the absence of a good definition of rhythmic signal. We propose a new definition of rhythmic signal using order restrictions and taking into account the needs of the biologists, and an algorithm based on order restricted inference and conditional tests to detect and classify the signals in different groups. We test the algorithm in simulations and with real databases from circadian clock, and compare it with the most usual methods available showing its good performance.

EO1215: **On comparing cumulative incidence functions in a competing risks model using empirical likelihood**
Presenter: **Hammou ElBarmi**, Baruch College, The City University of New York, United States
Co-authors: Vicente Nunez-Anton
An empirical likelihood approach is developed to testing the hypothesis that the cumulative incidence functions corresponding to k-competing risks are equal against the alternative that they are not equal or that they are linearly ordered. The proposed test statistics are formed by integrating a localized empirical likelihood statistic with respect to the empirical distribution. The asymptotic null distribution of these test statistics is found to have a simple distribution-free representation in terms of standard Brownian motion. The approach is extended to the case of right-censored survival data via multiple imputation. To illustrate the theoretical results, we discuss an example involving survival times of mice exposed to radiation.

EC1573: **Influence of microarray normalization strategies and rhythmicity detection algorithms to detect circadian rhythms**
Presenter: **Yolanda Larriba**, Universidty of Valladolid, Spain
Co-authors: Cristina Rueda, Miguel Fernandez, Shyamal Peddada
High-throughput microarray technologies are a widely used research tool in gene expression analysis. A large variety of preprocessing methods for raw intensity measures is available to establish gene expression values. Normalization is the key stage in preprocessing methods, since it removes systematic variations in microarray data. Then, the choice of the normalization strategy can make a substantial impact to the final results. Additionally, we have observed that the identification of rhythmic circadian genes depends not only on the normalization strategy but also on the rhythmicity detection algorithm employed. We analyze three different rhythmicity detection algorithms. On the one hand, JTK and RAIN which are widely extended among biologists. On the other hand, ORIOS, a novel statistical methodology which heavily relies on Order Restricted Inference and that we propose to detect rhythmic signal for Oscillatory Systems. Results on the determination of circadian rhythms are compared using artificial microarray data and publicly available circadian data bases.

EC1496: **A stochastic process approach to multilayer neutron detectors**
Presenter: **Vladimir Pastukhov**, Lund University, Sweden
Co-authors: Dragi Anevski
The feasibility of statistical determination of a neutron wavelength andenergy spectrum in the new generation of neutron detectors is discussed. The data from the multi-grid detector consists of counts of the number of absorbed particles, along the sequence of the detector cells.First, we consider the unimodal incident beam which is assumed to be a Poisson process. Using the Maximum Likelihood (ML) estimator we discuss its asymptotic properties. Next, we generalise this result for the case of the monotone spectrum of a multimodal Poisson beam. The last part is the ultimate challenge and is dedicated to the estimation the continuous spectrum of the incident beam, under the assumption of monotonicity.

EO191 Room 308 B RECENT ADVANCES ON ESTIMATING EQUATIONS Chair: Yves Berger

EO0627: **Smooth minimum distance estimation with generated regressors**
Presenter: **Daniel Becker**, University of Bonn, Germany
Co-authors: Valentin Patilea, Alois Kneip
In a recent study, a new class of smooth minimum distance (SmoothMD) estimators was proposed, that is suitable for models defined by conditional moment conditions. The SmoothMD estimator is extended to models with nuisance parameters or functions, and to generated regressors. The investigated framework includes nonlinear models with endogeneity, transformation models, as well as some semiparametric extensions. Particular attention is given to generated regressors. This topic has become quite important, especially due to the recent developments in the econometric analysis of treatment effects and in the identification and estimation of nonlinear models with endogenous covariates using control variables. The asymptotic behavior of the new SmoothMD estimator is studied under general conditions and new inference methods for complex models are proposed. A simulation experiment illustrates the performance of the methods for finite samples.

EO0638: **Bias-reduced double-robust estimation**
Presenter: **Stijn Vansteelandt**, Ghent University, Belgium
Co-authors: Karel Vermeulen
Over the past decade, double-robust (DR) estimators have been proposed for a variety of target parameters in causal inference and missing data models. These are asymptotically unbiased when at least one of two working models is correctly specified, regardless of which. While theoretically appealing, DR estimators have been the subject of recent debate. The reason is that model misspecification is likely to affect all working models in practice. Moreover, the performance of DR estimators can be sensitive to the choice of estimators used for fitting the working models, and can sometimes be worse than that of competing estimators that do not enjoy the double protection property. It will be shown that some DR estimators partially retain their robustness properties even under misspecification of both working models. In particular, we will propose a simple and generic estimation principle for the nuisance parameters indexing both working models, which is designed to improve the performance of the DR estimator, relative to the default use of MLEs for the nuisance parameters. The proposed approach locally minimises the squared first-order asymptotic bias of the DR estimator under misspecification of both working models and results in DR estimators with easy-to-calculate asymptotic variance. Results from simulation studies and data analyses confirm these theoretical properties and demonstrate major improvements relative to the default DR exposure effect estimators.

EO0710: **Estimating equations, empirical likelihood and complex sampling**
Presenter: **Yves Berger**, University of Southampton, United Kingdom
Most of mainstream statistic is based on independent and identically observations. However, this basic assumption does not hold with survey data, because units are often collected with complex sampling designs involving unequal probabilities and clustering. A novel empirical likelihood approach has been previously developed for complex sampling. We show how this approach can be used for conditional estimating equations. We

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