1112-60-425 **Daniele Cappelletti***, d.cappelletti@math.ku.dk, and **Carsten Wiuf**. *Complex Balanced Reaction Systems and Product-form Poisson Distribution.*

Stochastic reaction networks are dynamical models of biochemical reaction systems and form a particular class of continuous-time Markov chains on $\mathbb{N}^n$. We define the notion of 'stochastically complex balanced systems' in terms of the network's stationary distribution and provide a characterization of stochastically complex balanced systems, parallel to that established in the 70-80ies for deterministic reaction networks by Horn, Jackson and Feinberg. Additionally, we establish that a network is stochastically complex balanced if and only if an associated deterministic network is complex balanced (in the deterministic sense), thereby proving a strong link between the theory of stochastic and deterministic networks. Further, we prove a stochastic version of the 'deficiency zero theorem' and show that any (not only complex balanced) deficiency zero reaction network has a product-form Poisson-like stationary distribution on all irreducible components. Finally, we provide sufficient conditions for when a product-form Poisson-like distribution on a single (or all) component(s) implies the network is complex balanced, and explore the possibility to characterize complex balanced systems in terms of product-form Poisson-like stationary distributions. (Received August 10, 2015)