Heavy tails via phase–type distributions: construction, applications and estimation

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In this talk we expose some of the recent and ongoing research regarding the use of infinite–dimensional phase–type distributions as model for heavy tailed phenomena. Phase–type distributions are by construction quite user–friendly for deriving exact and/or explicit formulae en stochastic modeling where probabilistic methods often can bring us further with less effort when compared to their analytic counterpart. However, they also contain a number of difficulties when for example it comes to statistical inference and they are too restrictive in certain applications due to being light tailed. We shall try to address the last issue by constructing a new class of distributions of infinite dimensional phase–type distributions, NPH, which are genuinely heavy–tailed but at the same time preserve the phase–type structure and the mathematical tractability. We ouline their construction, basic properties and applications in renewal and risk theory and show how they may be used by calibrating an infinite–dimensional hyper–exponential to a Pareto distribution. Finally we discuss issues regarding the estimation of distributions from the class NPH, which in principle can be performed with similar methods as for finite–dimensional distributions.