Entropy rate of non-equilibrium growing networks ARDA HALU,
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London, GINESTRA BIANCONI, Northeastern University — In order to quantify
the complexity of networks, new entropy measures have recently been introduced.
Most of these entropy measures pertain to static networks or to dynamical processes
defined on static complex networks. In this talk, we will discuss the entropy rate of
growing network models, which quantifies how many labeled networks are typically
generated by those growing network models. We will present an analytical evalua-
tion of the difference between the entropy rate of growing tree network models and
the entropy of tree networks that have the same asymptotic degree distribution. We
will outline our finding that growing networks with linear preferential attachment
generated by dynamical models are exponentially less in number than the static
networks with the same degree distribution for a large variety of relevant growing
network models. We will also discuss the entropy rate for growing network models
that show structural phase transitions, including models with non-linear preferential
attachment. We will conclude by presenting numerical simulations showing that the
entropy rates above and below the structural phase transitions follow a different
scaling with the network size.

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