Preferential attachment trees with vertex death

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Preferential attachment models are a popular class of random graphs that have received a wealth of attention in the last decades and are often used to model evolving networks. In such models, new vertices are added to the graph sequentially and new vertices are more likely to make connections with existing vertices that have a large degree.

In recent work, we study a general preferential attachment model where vertices can both be added but can also be 'killed'. Such killed vertices can no longer make new connections, whereas 'alive' vertices continue to make new connections. This models evolving networks that can both increase as well as decrease in size.

We focus on *persistence of the maximum degree*: are the oldest alive vertices also the ones with largest degree? We uncover a novel regime in which killing of vertices makes such persistence entirely impossible.