Rooted weighted trees: Fat or tall?
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Let $V$ be a countable set and let $\mathcal{M} = (V, 2^V, \mu)$ be a finite signed measure space. Let $T$ be a rooted tree on the vertex set $V$. How can we describe the “shape” of the rooted weighted tree $(T, \mathcal{M})$? Is there a natural criterion for calling it “fat” or “tall”? We provide a series of such criteria and show that every ”heavy” rooted weighted tree is either fat or tall, as we wish. This leads us to seek hypergraphs such that regardless of how we assign a finite signed measure on their vertex sets, the resulting weighted hypergraphs have either a “heavy” large matching or a “heavy” vertex subset that induces a subhypergraph with small matching number. Here we also must develop an appropriate definition of what it means for a set to be heavy in a signed measure space.

This is joint work with Yinfeng Zhu.