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Actin Filamin networks and stress criticality BRIAN DIDONNA, University of Minnesota, ALEX LEVINE, University of Massachusetts Amherst, JOHN CROCKER, BRENTON HOFFMAN, University of Pennsylvania — We study critical behavior in a model biopolymer network comprised of semiflexible polymers crosslinked by extensible proteins with unfolding domains. The domains unfold reversibly at a critical pulling force. The force extension curve of such a crosslinker resembles a sawtooth function, with another domain unfolding and thus adding entropic compliance each time a critical pulling force is reached. Filamin and alpha-actinin are both biological crosslinkers which exhibit this sawtooth behavior. We demonstrate through theory and simulation that our model network exhibits critical pileup in the distribution of crosslinker lengths when it is sheared. This is to say, the population fraction of crosslinkers at a given tension dies exponentially away from the unfolding force of the unfolding domains. This leads to a novel force relaxation time scaling as crosslinkers are thermally excited over the unfolding threshold.

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