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### **Eukaryotic and Prokaryotic Cytoskeletons: Structure and Mechanics**

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The eukaryotic cytoskeleton is an assembly of filamentous proteins and a host of associated proteins that collectively serve functional needs ranging from spatial organization and transport to the production and transmission of forces. These systems can exhibit a wide variety of non-equilibrium, self-assembled phases depending on context and function. While much recent progress has been made in understanding the self-organization, rheology and nonlinear mechanical properties of such active systems, in this talk, we will concentrate on some emerging aspects of cytoskeletal physics that are promising. One such aspect is the influence of cytoskeletal network topology and its dynamics on both active and passive intracellular transport. Another aspect we will highlight is the interplay between chirality of filaments, their elasticity and their interactions with the membrane that can lead to novel conformational states with functional implications. Finally we will consider homologs of cytoskeletal proteins in bacteria, which are involved in templating cell growth, segregating genetic material and force production, which we will discuss with particular reference to contractile forces during cell division. These prokaryotic structures function in remarkably similar yet fascinatingly different ways from their eukaryotic counterparts and can enrich our understanding of cytoskeletal functioning as a whole.