

Using Realistic MHD Models to Connect Observations of CMEs to Their Physical Underpinnings
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Understanding how coronal mass ejections (CMEs) form and evolve in the corona and heliosphere is a key research topic in heliophysics. While our observational capabilities and modeling techniques have grown considerably in the past few decades, it remains difficult to unambiguously connect some observed aspects of CMEs to their physical underpinnings. In this talk I will give an overview of present techniques and challenges in realistically modeling CMEs, with a particular focus on how including synthetic observables can help bridge the gap between theory and observations. One such example is the study of large-scale waves launched by CMEs in corona (visible in the EUV and white light), where using simulations as digital laboratories has aided in interpreting previously ambiguous observations. Other aspects, such as the interaction of a CME with the ambient corona (related to observations of coronal dimming), and the challenges in modeling extreme events will also be discussed.