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The active Sun and its implication for the heliosphere
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A parametric study of CME rotation in the corona

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Many erupting filaments and coronal mass ejections rotate about the direction of ascent, often already in the low corona. The resulting orientation of CMEs is one of the two major parameters that determine the geoeffectiveness of ejections directed at the Earth. Two mechanisms have been proposed to explain the rotation at coronal heights: the helical kink instability and the Lorentz force by a shear field component due to sources external to the erupting flux. We present a parametric study of these effects in force-free equilibria containing a flux rope, confirming the relevance of both mechanisms. Three parameters of strong influence on the resulting total rotation are identified: twist, external shear field strength, and height profile of the external field. The individual contributions of the two mechanisms to the total rotation are difficult to disentangle. However, the height profile of the rotation, which can now be obtained for some events from stereoscopic observations, allows to constrain the individual contributions to some degree. This will be illustrated using the first such profile, derived from STEREO data of the "Cartwheel CME" on 9 April 2008.