Where do we stand in understanding prominence eruptions

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Abstract

Prominence eruptions are due to a violent destabilization of previously energized force-free coronal magnetic fields. But the detailed mechanisms which can [i] bring the corona towards an eruptive stage, then [ii] trigger and [iii] drive the eruption, and finally [iv] make it explosive, are not fully understood. A large variety of storage-and-release models have been developped and opposed to each other since the last decades. For example, photospheric flux emergence vs. flux cancellation, localized coronal reconnection vs. large-scale ideal instabilities and loss of equilibria, tether-cutting vs. beakout reconnection, local vs. inter active region couplings, and so on. The competition between all these approaches has led to a tremendous drive in developping and testing all these concepts, by coupling state-of-the-art models and instruments. Thanks to these developments, it now becomes possible to take all these models together, so as to identify and quantify the processes that contribute to [i-iv] respectively. I will show where we stand, and discuss which questions are still open. The hope is to move on to the development of yet-inexistant data-driven and physically-sound models, to catch-up with new observational puzzles and space weather forecasting.

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