The Origin of Mass, Magnetic Flux, and Magnetic Helicity in a Solar Prominence

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Solar prominences are cloud-like cool and dense plasma supported in the corona against the gravity, by highly non-potential, and very likely twisted magnetic fields. Therefore, the supply of mass, magnetic flux, and magnetic helicity is the necessary condition for the formation of solar prominences. We have been doing a series of case studies on the formation of a prominence in active region NOAA 8668. As a result, we have found a series of jets and eruptions in H alpha and EUV at the region where significant amounts of magnetic fluxes of opposite polarity canceled each other. The jets and eruptions can supply significant amount of material to the prominence. The magnetic flux associated with flux cancellation, and magnetic helicity injected by the shearing motion were more than enough for the formation of the prominence. Our results support chromospheric magnetic reconnection is the essential process of supplying mass, magnetic flux, and magnetic helicity necessary for the formation of prominences.