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### **Interaction of magnetic flux ropes: in situ evidence**

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Coalescence of magnetic flux ropes has been thought to play a crucial role for the turbulent reconnection evolution. However, the experimental evidence is very rare. In this talk, I will present the observational evidence of coalescence in the magnetotail and at the magnetopause, based on the measurements from Cluster and MMS. The reconnection event in the magnetotail shows that a number of magnetic flux ropes are created in the so-called ion diffusion region and then the adjacent flux ropes will merge. The generation and coalescence of magnetic flux ropes naturally lead reconnection into turbulence. The coalescence can occur not only near the X-line region but also in the regions far away from the X-line, e.g., in the outflow regions. According to the observations at the magnetopause and in the magnetotail, we suggested that the coalescence is common in the current sheets. Moreover, the waves excited within the flux ropes are explored also.

#### **References**

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