

## 2.2.1 How do CMEs contribute to the global evolution of magnetic flux in the heliosphere?

### Description of the objective:

- Temporal addition of closed flux by CMEs, which opens via interchange reconnection, conserves open magnetic flux while accounting for the rise in the observed heliospheric field strength near solar maximum (Owens and Crooker, 2006).
- CME induced interchange reconnection may also drive the reversal of the heliospheric open field (Owens et al., 2006).
- For this we need to understand:
  - How much axial magnetic flux is carried out by CMEs?
  - The opening time of closed CME flux through interchange reconnection.
  - The latitudinal separations of CME foot-points.
  - How does the in situ ICME magnetic flux compare to photospheric magnetic flux?

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### • SPICE:

- - **Target:** CME source region (if identified).
  - **Observing mode:** Composition mapping, CME watch.
  - **Slit size:** 6"
  - **Exposure time/cadence and number of X positions:** 100 s, X=160 for Composition mapping; 30 s, X=160 for CME Watch.
  - **Field of View:** 16°x11°
  - **Number of repetitions of the study:** 1 Composition mapping, 5 CME Watch (at least twice).
  - **Observation time per day:** 9.3 hours (3.21 hours per study for Composition mapping; 1.22 hours per study for CME Watch).
  - **Key SPICE lines to be included:** Ne VIII 770 Å, Ne VIII 780 Å, Mg IX 706 Å, O II 718 Å, O IV 787 Å, O V 760.4 Å, O V 761 Å, O VI 1032 Å, O VI 1037 Å, Ne VI 999 Å, Ne VI 1010 Å, Mg VIII 772 Å, Mg VIII 782 Å, C III 977 Å, Fe III 1017 Å - 2 profiles and 13 intensities or 4 profiles and 11 intensities (maximum of 15) for Composition mapping; C III 977 Å, O VI 1032 Å, O VI 1037 Å, Ne VIII 770 Å, Mg IX 706 Å, Fe X 1028 Å - 15 lines (5 profiles+10 intensities) for CME Watch.
  - **Observing window preference:** Multiple orbits.
  - **Other instruments:** EU1, PHI, SWA, EPD, MAG, SoloHI.
  - **Comments:** *The choice of lines, and also the number of intensities and profiles, is flexible, although the sum of the intensities and profiles is constrained to a maximum (e.g 15 for composition mapping). While varying the number of intensities and profiles, within the maximum, has no effect on the duration of the study, it will have an effect on the telemetry.*