The Origin of Magnetic Fields in Cataclysmic Variables

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Motivation

- We have synthesised a population of binaries to investigate the hypothesis that the fields in the magnetic cataclysmic variables (MCVs) originate during the CE phase.

| $\alpha$ | Number of PCEBs | PREPs(%) | MCV(%) |
|-------|------------------|----------|--------|
| 0.10  | 30517472         | 20.9     | 61.0   |
| 0.15  | 36099023         | 18.9     | 56.4   |
| 0.20  | 38666876         | 15.3     | 49.9   |
| 0.30  | 41197674         | 8.7      | 45.0   |
| 0.40  | 43654871         | 5.6      | 48.0   |
| 0.50  | 46289395         | 4.5      | 51.0   |
| 0.60  | 49010809         | 4.1      | 52.0   |
| 0.70  | 51888317         | 3.8      | 52.4   |
| 0.80  | 54664759         | 3.3      | 52.4   |

- We have used the $BSE$ code (Hurley et al. 2002) to evolve binaries from the ZAMS to the age of the Galactic Disc.

- Field: $B = 10^{13} \frac{\Omega}{\Omega_{cr}}$ G where $\Omega_{cr} = \sqrt{\frac{GM_{WD}}{R_{WD}^3}}$
Mass Distribution

\[ \alpha_{CE} = 0.10 \]

\[ \alpha_{CE} = 0.20 \]

\[ \alpha_{CE} = 0.30 \]

\[ \alpha_{CE} = 0.40 \]
Magnetic Field Distribution

\[ \alpha_{CE} = 0.10 \]

\[ \alpha_{CE} = 0.20 \]
- Theory Total
- C/O WDs
- He WDs
- O/Ne WDs

\[ \alpha_{CF} = 0.30 \]

\[ \alpha_{CF} = 0.40 \]
Comparison to Observations

- K-S tests applied to field and mass distributions show a better match to the observations at low $\alpha$. 

![Graph showing comparisons between observed and theoretical distributions for $\log_{10}(B/G)$ and $M/M_\odot$.]