The dichotomy between strong and ultra-weak magnetic fields among intermediate-mass stars

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Abstract

The current paradigm, the fossil field theory, describes the magnetism of intermediate-mass stars as remnant of an early phase of the star-life. But it is incomplete as it does not explain why only a small (_˜5-10%) fraction of the stars, the Ap/Bp, is known to be magnetic. Another important issue is that with magnetic field measurements limited to a special class of stars, stellar evolution models have no constraint on the surface magnetic field of a typical star in this mass range. In recent years, the new generation of spectropolarimeters has provided new clues to understand the origin of this magnetism as well as its influence on stellar evolution: observations revealed the lower bound to the magnetic fields of Ap/Bp stars and a two orders of magnitude magnetic desert between this lower bound and a new type of sub-Gauss magnetism, first discovered on the bright star Vega. This prompted a scenario where the strong fossil and weak Vega-like magnetisms originate from the bifurcation between stable and unstable large scale magnetic configurations in differentially rotating stars. In this talk I will review these new observational findings and discuss this scenario.

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