# Magnetic topologies across the fully convective threshold

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Dynamo action in fully convective stars is a debated issue that also questions our understanding of magnetic field generation in partly convective Sun-like stars, and in particular the validity of the $\alpha\Omega$ interface dynamo paradigm. Early theoretical studies suggested that without a tachocline, fully convective objects could only generate magnetic fields structured on small spatial scales and exhibiting large temporal variability. During the past years, studies based on the analysis of the Zeeman effect on photospheric spectral lines – either in unpolarized or circularly polarized light – have demonstrated that fully convective objects are able to trigger strong large-scale magnetic fields. In spite of recent advances, numerical and theoretical studies need observational guidance towards more realistic models.

A first spectropolarimetric survey, aimed at providing dynamo theorists with novel observational constraints, has been carried out. Large-scale magnetic topologies of a small sample of active field M dwarfs located on both sides of the fully convective boundary have been investigated by means of Zeeman-Doppler imaging applied on spectropolarimetric data. I will present the results on the effect of the two main parameters for stellar dynamo – mass and rotation period – on large-scale magnetic fields. The main conclusions of this study are: (i) A sharp transition in both large-scale magnetic topologies and magnetic energy spectra occurs close to fully convective threshold; and (ii) we find evidence for an unexpected new dynamo regime below 0.2 $M_\odot$: stars with similar mass and period trigger radically different magnetic fields.