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Magnetic stars as remote laboratories for magnetic physics[1]

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Understanding the magnetic field of the Sun, its dynamo origin, its evolution with time, and its interactions with the solar corona, solar wind and interstellar medium is important and exciting. But the Sun's field is relatively weak and globally disorganized. There are more massive stars whose magnetic fields are thousands (even tens of thousands) of times stronger, with dipole geometries more reminiscent of the Earth's field than the Sun's. Such fields can help regulate processes like radiative diffusion and gravitational settling in stellar atmospheres, and their Lorentz forces can even modify the spherical harmonics and the frequencies of a star's resonant vibrations. And even in the case of weaker solar-like magnetic fields, there are stars with exoplanets in tight orbits where the planet's magnetospheres is tangled with the star's magnetic field lines, generating activity in the star's atmosphere beneath the planet in its orbit. Examples of all of these types of systems have been studied through ultraprecise time series optical photometry with Canada's space telescope, MOST, often in concert with spectroscopy and spectropolarimetry from earthbound observatories. It'll be hard to cover so much parameter space in only half an hour, but I'll try to give you a glimpse at the surfaces of these stellar magnetic labs, and even a peek inside their normally hidden interiors.

[1]Including data from MOST (Microvariability & Oscillations of STars), a Canadian Space Agency mission operated by Microsat Systems Canada Inc., and the Universities of British Columbia and Toronto, with the assistance of the University of Vienna.