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Convection in Cool Stars, as Revealed through Stellar Brightness Variations

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As a result of the high precision and cadence of space-based photometric surveys like Kepler, we may now directly observe the very low-level light variations arising from stellar granulation in cool stars. Here, we discuss how this enables us to more accurately determine the physical properties of Sun-like stars, to understand the nature of surface convection and its connection to magnetic activity. We present recent results that tie "flicker" to granulation and enable a simple measurement of stellar surface gravity with a precision of 0.1 dex. We discuss how these light curves can be used to probe stellar evolution and help place constraints on models of stellar convection. We show that flicker may be used to probe convection in stars with surface gravities as low as 1.5, and we demonstrate that, in concert with asteroseismically measured surface gravities, it might be used to examine differences in the convective properties of red giant, red clump, and secondary clump stars. Finally, we discuss how we may quantitatively predict a star's radial velocity jitter from its brightness variations, permitting the use of discovery light curves to help prioritize follow-up observations of transiting exoplanets and to open exoplanet discovery in previously inaccessible domains.