Stellar Variability in Planetary Transit Searches
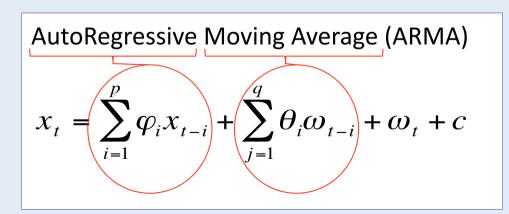
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Variability on hours timescales:

… causes detection problems for long period planets.

… introduces errors on derived system parameters.

Want to characterize variability as function or stellar properties, using methods such as:

AutoRegressive Moving Average (ARMA)

$$x_t = \sum_{i=1}^{p} \varphi_i x_{t-i} + \sum_{j=1}^{q} \theta_i \omega_{t-i} + \omega_t + c$$

Also…

ARIMA – for non stationary data
SARIMA – seasonal trends

Example Using Solar Data

Light curve and power spectrum of the PMO6 total solar irradiance (1996-2001), showing a multi-component autoregressive fit.
(from Aigrain et al 2004, A&A, 414, 1139)