Starspots, like sunspots, are dark cooler regions associated with strong magnetic fields. They are surrounded by granules which are convecting cells of plasma.

**What are Starspots?**
- Umbra
- Penumbra
- Granules

Faraday’s law and Ohm’s law explain why starspots are cooler and darker than the surrounding area.

\[ \varepsilon = \frac{d\phi}{dt} \]

If \( R \rightarrow 0 \) and \( \varepsilon \neq 0 \), then \( I \rightarrow \infty \). This is impossible, therefore \( \varepsilon = 0 \).

If \( \varepsilon = 0 \) then \( \frac{d\phi}{dt} = 0 \), therefore \( \phi_B = \text{constant} \).

In physical terms this means that the magnetic field lines are anchored to the plasma, a process known as flux freezing.

**How are Starspots formed?**
- Differential rotation allows plasma at different latitudes to rotate at different rates, dragging the magnetic field lines with it.
- This causes the magnetic field lines to tangle and kink; it is at these locations that starspots form.
- Due to \( qv \times B \) forces the magnetic field lines act like elastic cords under tension (a phenomenon known as magnetic tension).
- Magnetic tension in a starspot resists horizontal motion of the plasma, suppressing convection.
- This greatly reduces energy flow from below, causing the area to cool, therefore forming a spot.

**Babcock Model of the Solar Cycle**
- "kink" = location of starspot formation

**Instrumentation**
- 0.3-m Meade Schmidt-Cassegrain telescope
- SBIG ST-8XE CCD Camera
- Standard astronomical B, V, R and I photometric filters

**Image Processing**
Raw images must be processed to correct for various errors. Types of errors include:
- Vignetting - The uneven illumination of the optics darkens the edges around the image
- Dark current noise - Electrons are excited thermally instead of by photons

**Photometry**
*Mira Pro 7 UE* was used to perform differential aperture photometry to measure changes in LO Pegasi’s brightness relative to a comparison star of constant brightness. Use of a comparison star compensates for changes in the amount of atmospheric absorption as the star’s angle from the horizon changes during the night. Light curves were created by plotting LO Pegasi’s brightness vs. the rotational phase for each filter.

**Light Curve Inversions**
The Light-curve Inversion algorithm developed by Harmon was used to convert variations in brightness into surface images of LO Pegasi. The algorithm exploits differences in the degree of limb darkening through different filters to improve the latitude resolution of the inversions.

**Results**
- At right are V-filter light-curves from 2011 June 14 - July 10.
- In 1999, Lister et al. (MNRAS, 307, 685) reported a rotation period of LO Pegasi of 10.17h. (Top graph)
- However, a period of 10.153h was found to fit our data better. (Bottom graph)
- The images below show changes in the starspots of LO Pegasi from 2006 to 2011.