Magnetic elements as bright points in the Hα wings

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DOT Hα channel
Observations

- Magnetic elements show up as bright points in the G band, CN band, the wings of Ca II H&K, and the wings of Hα.

- Hα wing: BPs are very bright, thanks to low granulation contrast, though less sharp than in G band.
Questions:

• Are the bright points in the H\(\alpha\) wings formed in LTE?

• Why does one not observe reversed granulation as in the wings of Ca II H&K?

• Why is the granulation contrast so low in the H\(\alpha\) wings?
Simulations: LTE suffices

\[ \frac{\partial I}{\partial z} \]

\[ S/B(\tau) \]

\[ \tau \]

\[ T(\tau) \]
No reversed granulation: not enough opacity in lower chromosphere
Low granulation contrast

- Source function and the opacity of Hα sensitive to temperature variations.

- Emergent intensity insensitive to temperature variations.
Comparison of observations and simulations

- Simulation (bottom panels): similar appearance.

- Simulated bright points track magnetic field.

- Bright point contrast is bigger in observations.
Summary & conclusions

• I compared observations and simulations of bright points in the blue wing of the Hα line.

• The line wing forms in LTE in the photosphere.

• Bright points coincide with intergranular magnetic fields.

• The Hα line wing is a suitable proxy magnetometer thanks to low granulation contrast.
Hα vs ‘fake’ Hα

• Compare Hα (lower level at 10.2 eV) with fake Hα (lower level at 1 eV).

• Hα: RMS=0.0116

• fake Hα: RMS=0.0307
Scatterplots