Determining coronal bright point size using cross-correlation techniques and data from AIA/*SDO*

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1. Introduction

Background

Coronal bright points (CBPs) are seen ubiquitously in the solar atmosphere at several EUV and X-ray bandpasses. They are thought to be associated with converging areas of magnetic flux at opposite polarities.

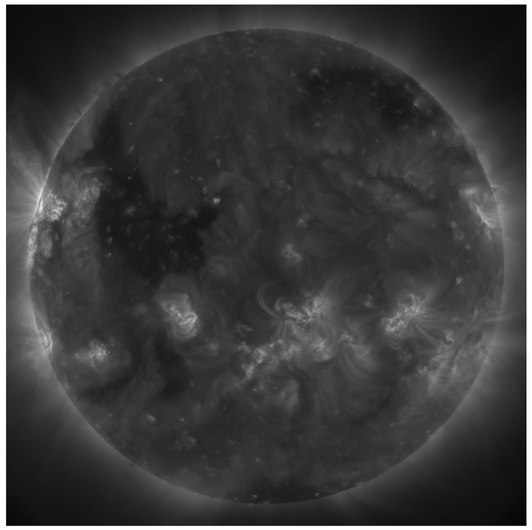

Figure 1: Full disk in AIA 193Å bandpass. A coronal hole is present in the upper left region.

Motivation

Previously, the size of CBPs has been determined using the intensity at a single point in time, compared to the background intensity.

2. Observations

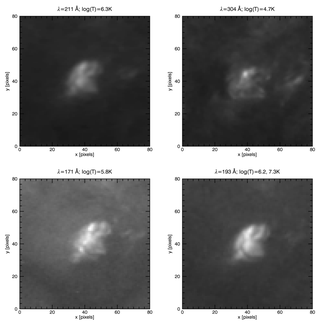

Figure 2: Multi-wavelength images of the CBP studied for this project. The data from 94Å and 131Å was too noisy, and therefore not shown here.

The Atmospheric Imaging Assembly (AIA) on board the *Solar Dynamics Observatory (SDO)* obtains images at a cadence of 12 seconds over multiple EUV bandpasses. Six of these were investigated here to compare the results over different temperatures/heights in the solar corona.

3. Methods

Mathematical

The formula for cross-correlation is given by:

$$f(t) \star g(t) \equiv f(t) * g(-t)$$

Numerical

For programming, the cross-correlation is calculated using:

$$\sum_{0}^{N-1}$$

4. Results

By employing the algorithm from McIntosh et al. (2008), the inner structure of the CBP was revealed, most apparent in the 193Å data. By cross-correlating each reference pixel with every other pixel in the image, a ring-shaped structure was revealed around this core, with low values of cross-correlation in between.

5. Conclusion

References