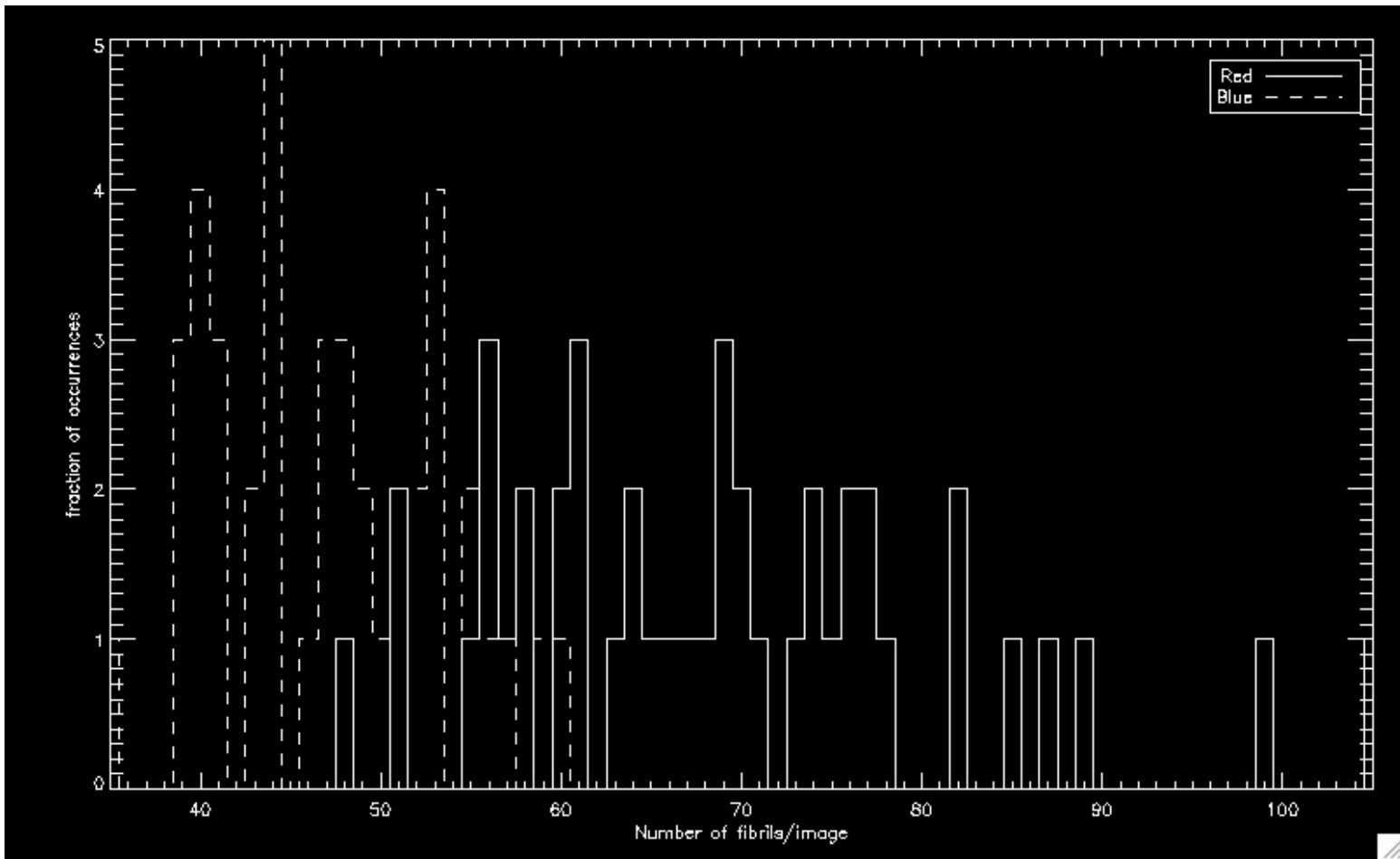


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Super-fast Phenomena in the Chromosphere  
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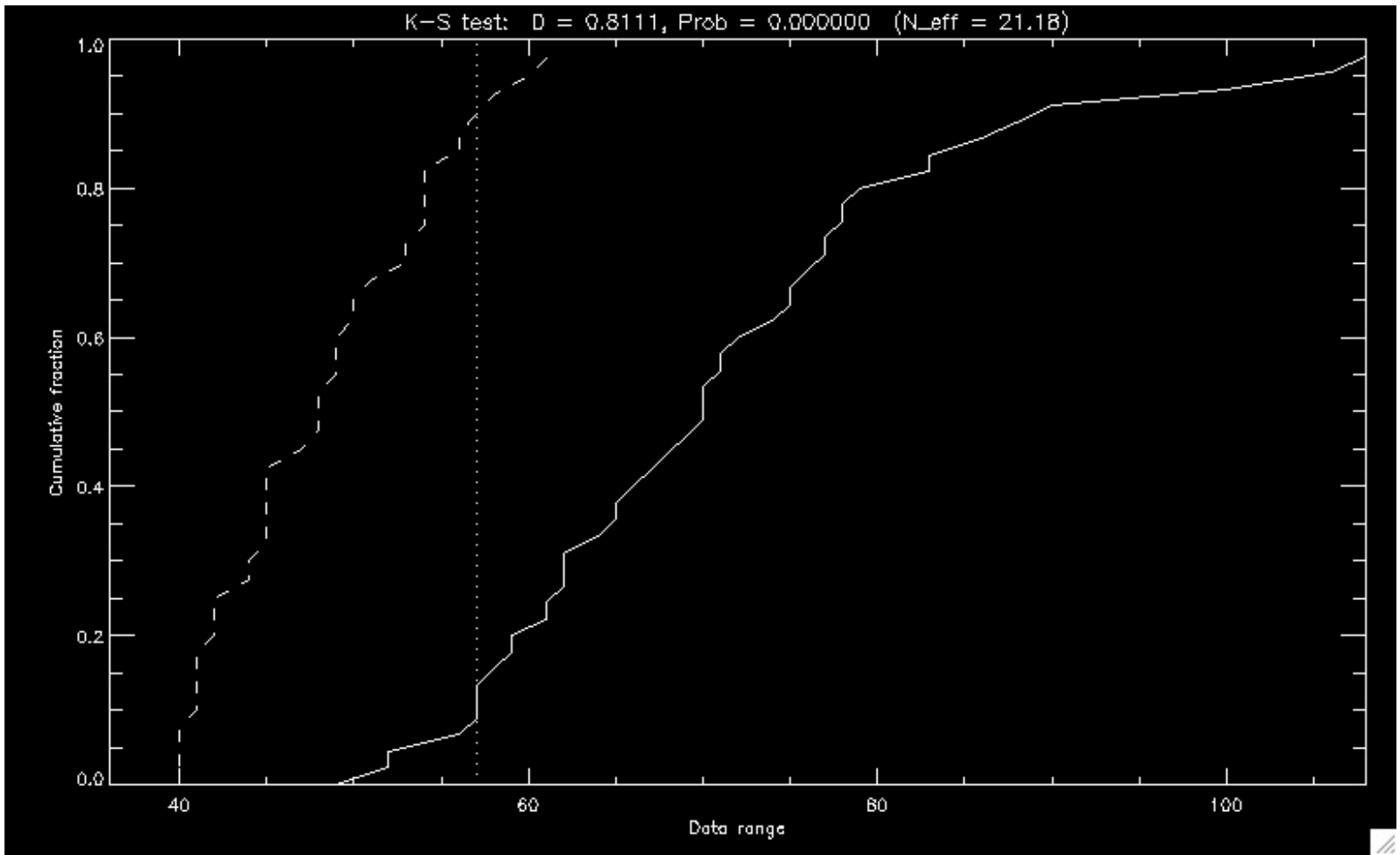
Of several thousand individual data frames, 871 processed images of the same active region on the Sun were taken at different times over a period of 20 minutes by the IBIS instrument at the Dunn Solar Telescope. These images are taken at varying wavelengths across both the H-alpha line and the Calcium II 854.2 nm line. Visible in each frame are multiple chromospheric fibrils that sometimes exhibit super-fast phenomena of interest.

We wanted to get a numerical value of the average number of fibrils per frame for images taken in H-alpha. We were curious as whether this number would be different for red frames taken at wavelengths above H-alpha and blue frames taken at wavelengths below H-alpha. I selected 96 frames: 40 of which were blue frames and 56 of which were red frames. I then developed a method to systematically count the fibrils in each frame. I plotted each image in *imap* from IDL and ordered them to be overlaid with rectangular grid boxes to make counting easier (simply count the fibrils in each grid box). The grids are arbitrary in shape in size, but each grid covers the same solid angle of the Sun as seen from Earth. Fibrils were counted only on the visible disk of the Sun, not above the limb.

I saved each frame in question and marked each fibril. I counted up a total number of fibrils for each frame. The average number of fibrils per image for the blue frames was 47.95. The average number of fibrils per image for the red frames was 73.50. As can be seen, the red frames have a significantly higher average number of fibrils than do the blue frames. There are 62 grid cells on the solar disk, so the average number of fibrils is 0.77 and 1.19 per cell. The area of the Solar disk in these images is about 100 square degrees (in heliographic coordinates) or about 0.03 steradians, about 1/400th of the solar surface. This means that at any time we might find about 30,000 of them on the Sun.



Upper: A chart of the 40 blue frame fibril numbers and the 56 red frame fibril numbers. Both sets of data contain varying values, but it can be seen easily that the red frames have a higher maximum and in general higher fibril values.



Upper: A statistical analysis of our results depicting the cumulative percentages of data in a certain range.

Below are two images (upper red, lower blue) of two sample frames used for this counting project. Circled in red are the fibrils. It can be seen even with only one random sample frame set that the red images have a higher density of fibrils than do the blue ones.

The next step from here is to further examine the differences between the Sun's appearance in these wavelengths and extend this analysis to how the Sun changes over time.

