

# HYDRA FIBER THROUGHPUT

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The Hydra fiber cable suffered a severe accident, where its support structure failed and the cable was stretched and twisted, by about 0.5m. Inspection of the cable showed that at least some of the ‘thin’ fibers (currently not used) were damaged. However, a quick inspection of a projector flat (pflat) taken in large circle configuration indicated that the active large fibers were not damaged by the accident.

It would be nice to quantify the extent of the damage, if any. To this end, we compared the fiber throughput in a series of pflats taken shortly after the accident, and a series of pflats taken during a run by R. M. Rich in August 2007 and August 2008.

The first comparison is shown in Figure 1 (bottom panel), and compares the relative throughput for fibers before the accident (pflat taken on August 2, 2008) with the relative throughput after the accident. The next panel from bottom also shows a comparison between the March 2009 relative throughput and the August 3, 2008 pflat.

At face value this appears to indicate a RMS 25% loss in throughput with respect to the earlier dataset. However, if we compare two pflats taken before the accident, on August 2 and 3, 2008 (third panel from bottom), we see that the fiber throughput appears to have undergone an 8% RMS shift from one day to the other. A further comparison can be made between the August 2, 2008 pflat and one taken on August 5, 2007 in the top panel:

In this case one sees that the older pflat has higher throughput by 50% or more in some cases. In all cases, there is considerable scatter (amounting to a 50% throughput variation).

What can one learn from this? A caveat is that pflats may not have been the best choice to carry out this measurement. They were chosen, in preference to dome flats, because pflats are more convenient (the quartz lamps are brighter and obtaining pflats is a less cumbersome option for the mountain staff). However, it appears that there is significant throughput variation within each pflat and that pflat to pflat variations of the order of a few 10% are not uncommon.

To the extent that we can determine this, the apparent 25% RMS loss in Figure 1 is probably within the ‘natural’ variation of the instrument and does not indicate (or confirm) that significant damage to the thick fibers was caused by the cable connector accident.

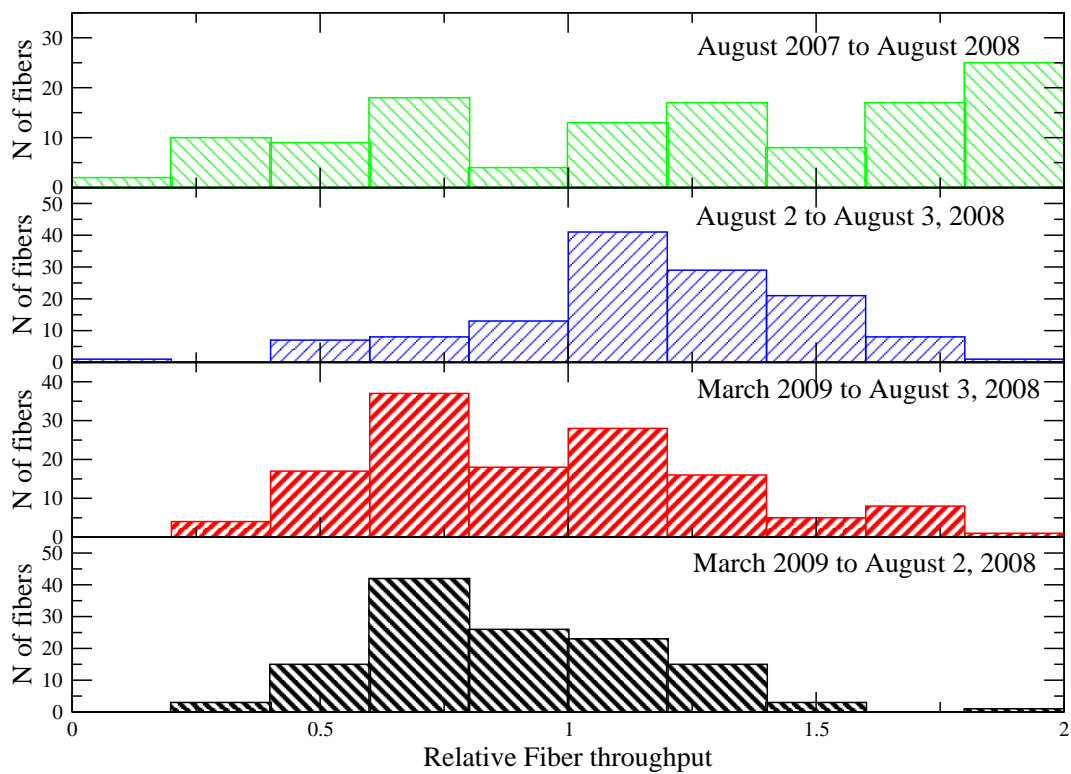


Figure 1: A comparison of relative fiber throughput, pflats taken several days or months apart