THE LIMB FLARE OF AUGUST 11, 1972*

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Abstract. A limb flare is described that occurred above a complex and very active sunspot. Four stages can be distinguished: the flash-phase, the spray-phase, the surge-phase and the loop-phase. Each of them had a duration that was longer than that of the preceding one. In the spray ascending speeds up to 745 km s\(^{-1}\) and accelerations up to 1.3 km s\(^{-2}\) were recorded. The loop-phase has been observed in the coronal lines 5303 and 5694 Å. The yellow line, being very weak before the flare, became extremely strong in the loop and surpassed five times the intensity of the green line. X-ray bursts and ionospheric disturbances of long duration demonstrate that not only the flare itself but also the loop was a source of X-rays. Most of the radio-bursts can be ascribed to specific features in the H\(\alpha\)-records of the event.

1. Introduction

A sunspot group remarkable for its size, its structure and especially for its activity, passed the Sun's disk from July 29 to August 11. Its heliographic latitude was \(b = 13^\circ\), and its heliographic longitude \(l = 10^\circ\). On August 5 it covered an area of 2300 millionths of the solar disk. The group consisted of a conglomerate of numerous umbrae, some of them were of southern, but most of them of northern polarity; all were imbedded in a common roundshaped penumbra. Sunspots of such a structure in which umbrae of opposite polarity lie close together, thus forming a large gradient of the magnetic field, are known to be centers of high activity. They produce not only numerous flares, but also especially strong ones. Such flares appear repeatedly in similar shape in intervals of a few days. The first important flare was observed on August 2, it was followed by an even larger one on August 4 and another of the same size on August 7. A further flare occurred on August 11. The former flares, on which we will report later on, were observed in front of the solar disk, the flare of August 11, however, took place at the limb of the Sun. This situation allowed the optical observation of the coronal disturbances connected with the flare.

2. Time History of the Flare

The spot was observed in white light for the last time at 1130 UT, showing a distance of 89° to the center of the solar disk. It was situated almost exactly at the solar limb, when the flare and its succeeding phenomena occurred between 12h and 16h. The entire event was recorded by the cinematographic H\(\alpha\)-camera of the Swiss Federal Observatory. The interval between two consecutive pictures was one minute. The H\(\alpha\)-filter was tuned to the center of the line and had an effective pass-band of 0.5 Å. The

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Fig. 1. The flash- and spray-phase of the limb flare of August 11, 1972. Position angles increase from right to left.